American Railroad Journal.

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INCREASE OF SPEED IN PASSENGER-TRAINS.

BY WILLIAM S. VEST.

[Written for the AMERICAN RAILROAD JOURNAL.]

THE leading newspapers of the country have recently been calling the attention of the public to the importance of obtaining more rapid transit between the great commercial centres of the Union. It is high time they should do so. The present age is preëminently a progressive one in almost every way, but the attainment of very high speed on our principal lines of travel is certainly a prominent exception. When Dionysius Lardner, some fifty years ago, was lecturing to large audiences, proving to his own satisfaction, no doubt, that transatlantic steam-navigation was utterly impracticable, trains were flying over the Great Western Railway in England, nearly if not quite as fast as now. Some two or three years later the learned scientist's theories were utterly demolished by the successful trips of the *Sirius* and *Great Western* in fourteen days. Since then, their gigantic successors on the ocean, aided by Ericcson's propellor, iron hulls and compound engines, have succeeded in cutting this time down fully one-half. No such radical improvement marks the record of the railways. They too, have had equal facilities for their speed being increased in the same ratio with the steamers, yet the rate attained to day—on English lines at least—shows but little advance on that furnished fully a generation ago.

In the United States, as compared with England, great progress has been made, Speed on most of our railways has rapidly increased, but certainly not in proportion to their ability for making it, considering the vast advantages gained in this respect by the almost universal use of steel rails, and far greater motive power. There is no doubt that our people fully appreciate the truthfulness of the trite saying: "Time is Money." Knowing this, it would be natural to suppose that our railway authorities would offer to the traveling public the highest possible rate of speed consistent, of course, with safety. That this is not done can be easily proved by the railway time-tables of the day.

It is probable that at the north the average increase in speed during the last quarter of a century has not been more than thirty per cent., while at the south it has been much greater. Some trains there run nearly as fast as they do anywhere, and some of them even faster. This they are abundantly able to do, the almost total absence of steep grades and short curves on many of them, and the comparatively few stopping places, giving them great facilities for doing so. It is safe to say that since the war of secession the average speed has been doubled, even trebled on most of them. Many instances could be given to prove the truth of this assertion, but one or two will suffice. Less than thirty years ago the regular schedule time of the mail-trains from Charleston to Columbia, 130 miles, exceeded eight hours—it is now only three hours and twenty minutes. The Northeastern Railway, by its route from Charleston to Columbia, is eight miles longer. It runs a daily train between the two cities also in three hours and twenty minutes, being at the rate of 41⅝ miles per hour. This is claimed to be the fastest time, perhaps erroneously, made in the United States by any single line over 100 miles in length. Few persons are aware that when traveling from New York to Jacksonville they go seven miles an hour faster during the southern half of the journey. Mail agents leave Charleston every morning for Jacksonville, Fla., dine there, and return to Charleston in time for supper—a good day's work, as far as distance is concerned, it being fully 570 miles. Everywhere, from Virginia to Texas, is the speed increasing, and there is reason to believe that in a few years the fastest trains in the United States will be running on southern railways.

Very different roads are they now from what they were many years ago, when the writer was employed as superintendent of machinery on one of them in Georgia. Such was the condition of its road-bed that miles of it were in winter under water, or rather a mixture of that element with mud, forming a paste the consistency of cream. The depth of it was sufficient at times to extinguish the fire in the locomotive furnaces. A new set of cross-head brasses were worn out every day in running only 90 miles. That railway now is first-class in every respect, and forms an important link in the through line from Chicago to the south. It is very evident that shortening the stoppages, and making them only when necessary, accounts in some degree for the quick schedules of today. Those who were doomed to travel through the southern states thirty years ago cannot fail to have a lively recollection of the time wasted at way-stations everywhere. A passenger might leave the cars, go into the adjoining woods, shoot a squirrel or two, and leisurely returning, find his train still motionless. If he asked what it waited for the invariably answer was, "Schedule time not yet up." At a well-known stopping place on one of the principal southern railway lines, the time of detention in ante-bellum days was fully half-an-hour. Turning to a time-table of that road for to-day, the writer finds it reduced to one minute only.

It has been well said that misfortunes sometime prove blessings in disguise. The war of secession caused the complete destruction of many southern railways. Culverts, bridges, rails, cross-ties, rolling-stock—everything was swept away. Such injury admitted of no repairing, and they had to be completely rebuilt. All, with few exceptions, were financially ruined, including those which had escaped material injury. Their stock was bought at

a low price by northern capitalists who, with abundant means, have lost no time in making them what they now are, thoroughly "reconstructed" in every way, and probably far superior to what they would have been if they had escaped damage and remained in possession of their former owners. The loss sustained by those owners was immense, but the gain to the traveling public and the country at large is equally so. The rapid progress made by what is called the "New South," has attracted universal attention, and deservedly so; but that progress has in no way been so plainly manifested as in the great improvement of its railways,

All this is encouraging, and goes to show that the average rate of speed has been greatly increased in all parts of the Union; but the stubborn fact remains that the maximum speed attained is no greater than it was in England fully forty years ago. There is only one railway in the United States on which it exceeds 45 miles per hour; and only a few where the regular schedule time exceeds 40 miles. By far the greatest number are content with 30 miles per hour, and even less. The general use of steel rails and powerful locomotives seems to have had but little effect so far as increased speed is concerned. The risk of derailment does not by any means increase with speed; and even if it did, the improved condition of railway tracks, in solidity and smoothness, ought to neutralize this danger. The public is not unreasonable. It would probably be satisfied if provided with one train a day between the principal cities going at the rate of 50 miles per hour, stoppages included—as the extra limited express from New York has been and is doing, without any apparent want of patronage. If such a fast train as this should be provided there would be no more complaints made of slow time. The Post-Office Department could lend a helping hand in bringing about such a favorable result. It might offer for those lines on which its mail matter is the heaviest, a subsidy to be largely increased in proportion to every mile of speed gained. If inducements of this kind were offered, favorable results would soon follow and in this age of lavish expenditure of the public's money, the people generally would not grumble at the additional expense.

A recent writer in the JOURNAL complains, and justly too, of the increasing heaviness of our sleeping and palace-cars. From his account it seems that luxury and weight go hand-in-hand together. Another writer suggests that they might be framed and paneled with sheet metal, but thinks the noise made would be too great. A film of india-rubber would obviate this. Air-cushions might be substituted, covered with some new style of asbestos cloth yet to be invented—in fact the whole interior might be lined with it, rendering all cars in a measure, fire-proof, and thus preventing a repetition of those calamities in one of which, by a sad fatality, a palace-car designed by the lamented Wagner became his own funeral pyre. Still further improvements looking to the safety of the passengers will no doubt be made. Some philanthropic car-builder of the future may design a telescopic car that, when a collision takes place, suddenly contracts to half its ordinary length. Steel cylinders with pistons running lengthwise may be brought into use, and with the aid of atmospheric air will act as "buffers," precisely as those now in use to deaden the recoil of our heavy 15-inch guns. The passengers might find themselves quickly brought into too close a contiguity to be pleasant, but still no damage would ensue to life or limb.

Heavy as our Pullman or other palace-cars may be, their weight is no excuse for a limited rate of speed. The modern locomotive, if its full power was called upon, would prove itself capable of going faster than George Stephenson ever dreamed of It is as near perfection as human skill and ingenuity can make it, and as regards symmetry of appearance, place the American passenger locomotive alongside one of English make, and the comparison would naturally be—a race horse to a rhinoceros.

The truth is, our railway magnates have the Roman maxim *Festina Lente*—it ought to be engraved on their corporate seals — too strongly impressed upon their minds. At any rate they thoroughly carry out its precept and when asked for increased speed prove worthy graduates of the Barnacle school in knowing "how not to do it." Still, the signs of the times are encouraging to the advocates of rapid transit. He should not be too sanguine a prophet who predicts that in the first quarter of the twentieth century most of our railway-trains will travel at a rate of speed fully exceeding by one-half the fastest now known, carrying three times the number of passengers, in cars better ventilated and far more safe in every way; that double tracks will be the rule and not the exception, and that the light of a summer day dawning upon a lightning express train in New York will at its close find it flying through the orange groves of Florida. The world moves, as Gallileo said, and it moves in the right direction.

RAILWAY MEDICAL SERVICE.

BY S. S. HERRICK, M. D.,

SECRETARY STATE BOARD OF HEALTH OF LOUISIANA.

[Written for the AMERICAN RAILROAD JOURNAL.]

SECOND SERIES.--THE UNITED STATES.

VI. THE BALTIMORE AND OHIO RAILROAD COMPANY.

THE medical service of this company was organized in 1880, under the title of "The Baltimore and Ohio Employés' Relief Association." Membership in the association was at first optional, but after February 15th, 1881, it was announced that no one would be employed by the company except on condition of becoming a contributing member, and that no employé over forty-five years of age should be eligible to membership without obtaining a medical certificate of sound health. It was also determined to employ no person thereafter except those in good physical health and not over forty-five years of age. The amount of contribution varies with the monthly wages, but employés are divided into two classes, with reference to hazard of service, the first embracing those in the operating department and the second all others.

The chief features of the association are as follows: 1. A daily allowance for those disabled by accident in the discharge of duty, and an insurance payment in case of violent death. 2. A daily allowance for members unable to work from natural sickness or injuries incurred otherwise

than in discharge of duty, provided that no allowances be made for disablement of less than six working days' duration. 3. Payment of a fixed sum after death from natural causes.

The accompanying table shows the amount of payments in various cases and the benefits to which they are entitled.

SALARIES.	PAYMENTS PER MONTH.	BENEFITS. 1. In case of temporary disablement by accident, while in the discharge of duty, the monthly payment for a period not exceeding six months of	2. In case of permanent disablement and incapacity to resume employment arising from accident while in the discharge of duty, the monthly payment (after the 6th month) during continuance of such disablement of	3. In case of death arising from accident while in the discharge of duty, the payment to the legal representative within sixty days after death of	4. In case of injury or sickness from any cause other than accident while in the discharge of duty, causing total inability to labor, the payments (not longer than 1 year) of a daily allowance of	5. In case of death arising from any cause other than accident while in the discharge of duty, the payment to the legal representative within sixty days after death of †
		Per day.	Per day.*			
1. Those receiving $35 and under per month should pay	1st class $1.00 2d " .75	$ .50	$ .25	$500	$ .50	$100
2. Those receiving $35 and not more than $50, should pay	1st " 2.00 2d " 1.50	1.00	.50	1,000	1.00	200
3. Those receiving $50 and not more than $75 should pay	1st " 3.00 2d " 2.75	1.50	.75	1,500	1.50	300
4. Those receiving $75 and not more than $100 should pay	1st " 4.00 2d " 3.00	2.00	1.00	2,000	2.00	400
5. Those receiving $100 should pay	1st " 5.00 2d " 3.75	2.50	1.25	2,500	2.50	500

*Including free surgical and hospital treatment.
†Subject to increase predicated upon surplus at end of each year, now double this stated allowance.

It is provided that no employé can enter a lower grade in the association than the one corresponding to his monthly pay, but any one can join higher grades by paying the amounts fixed for such grades, payments in all cases being deducted from monthly wages. Although membership was at first optional, the association started with one-third of the working force of the company, and the proportion has since increased to more than eighty-five per cent.

In order to insure success to the enterprise, the company generously appropriated $100,000 as a foundation of the benefit system, and gave the services of its officers to perform the necessary clerical work together with office-room. Also, preference is given to the widows, wives, sisters and children of faithful contributing employés for such work as they are qualified to perform, when needed by the company. Free transportation over the lines is given to children of employés when going to or returning from school, for distances not exceeding ten miles; and half-fare transportation to contributing members and their families at all times.

Neither the company nor the association owns a hospital, but arrangements have been made for the admission of members to hospitals at Chicago, Columbus, Pittsburgh, Wheeling, Washington and Baltimore. The association pays for surgical attendance at hospitals and the member pays for his board. As the latter is never more than $2.50 per week, this is more than met by his allowance from the association.

The management of the association is divided between the company and the members, in the proportion of four representatives chosen by the former to five by the latter. The salaried officers consist of the secretary, Dr. W. T. Barnard, and seven medical inspectors. The latter are assigned to specified districts, which they are constantly traversing to investigate cases of disability, the sanitary condition of the lines, etc. They also attend persons injured by the casualties of traffic, both employés and passengers, make physical examination of applicants for employment by the company, and inspect the sanitary condition of grounds, buildings, carriages, baggage, etc. They vaccinate employés and provide appropriate remedies for the relief of such disorders as malarial fevers and intestinal irregularities, wherever they are found prevalent.

Another liberal provision of the company, of a non-medical character, is the furnishing of books at many of the stations, for the particular use of members convalescent from sickness or injury; and these collections of books are moved from one station to another at intervals, in order to afford change of reading. Besides, free reading-rooms have been established at some of the most important stations, provided with writing materials, periodicals and collections of books.

An annuity fund has also been created under direction of the company, to which any employé may contribute regularly whatever sum he may choose. On reaching the age of sixty-five, he is entitled to an annual allowance during life of ten cents on every dollar paid by him to this fund, with the addition of half-a-cent on the dollar for every year his contributions have been made. Thus, beginning at the age of thirty-five he will have paid, at the rate of $5 monthly, $1,800 in thirty years; which will give an annual allowance thereafter of $180, besides fifteen cents additional on each dollar for the thirty years of contribution, or $270 more; both being equivalent to an annual pension of $450. If he stop contributing at any time, without withdrawing payments, he is entitled at the age of sixty-five to his annual allowance of ten per cent. of the amount paid in, together with the half-cent for each year of contribution reckoning from the middle period to the age of sixty-five. In case of death before the age of sixty-five, his legal successor is to receive the whole sum paid in, increased by one-half; and a member has the option of drawing from the fund, at any time, three-fourths of the amount paid in, on relinquishing claim to future participation. Any member between the ages of sixty-five and seventy may receive a sum in one payment equal to five years' allowance, in full settlement of his claim on the fund.

There is also a savings and building feature of the association, which was inaugurated August 1st, 1882. Deposits are received from contributing members of the

association, and their wives, of sums not less than $1 nor more than $100 at one time, on which interest at four per cent. is allowed upon sums of $5 and upwards deposited not less than three months. Contributing members of three months' standing, having deposited $50 or more, may effect a loan at interest of six per cent., to be applied under direction of the trustees of the fund to the purchase of a homestead. The title of the property is vested in the association, or some designated trustee, until the full indebtedness is paid, the borrower meanwhile enjoying the use of the homestead; but on failure of three monthly instalments to the relief feature (which must correspond to an amount payable at death sufficient to secure return of the loan) the property is sold, and the member will receive whatever sum is left after payment of all expenses incurred. Insurance and taxes on the homestead are at the charge of the member during occupancy. The loan is to be returned by payment into the savings fund of not less than one per cent. monthly, until principal and interest are fully settled, through orders on the company applicable to monthly wages. Should the borrower leave the company's service, his privilege on the property remains, on condition of continuing the regular payments as before.

Old readers of the JOURNAL will observe a similarity between the association just described and similar ones instituted by railway companies in France and Italy for the benefit of their employés. The natural outgrowths of such organizations are: 1. Self-denial and economy, to save means for providing future relief and comfort, which imply temperance and orderly conduct. 2. Attachment to the company, which offers advantages proportionate to length of service, and in return more efficient service due to experience and mutual good-will. 3. Extinction of incitements to strikes, reprisals and damage-suits. There can be no reasonable doubt that the Baltimore and Ohio employés are fully satisfied with their share of the arrangement, and that the company has found its interest in the investment of $100,000 to secure contentment, good behavior and efficient service, not to mention decrease of legal expenses.

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The second series of these articles on "Railway Medical Service" appropriately ends with this, the closing number of the fifty-ninth volume of the JOURNAL. During the past month the Pennsylvania Railroad Company has inaugurated a medical service on a plan which promises excellent results, though it is meeting with some opposition from employés, but as the provisions of this service were fully detailed in the last issue of the JOURNAL, further discussion of the subject seems unnecessary, at least for the present.

RAILWAY LUMBER YARDS.

BY W. E. PARTRIDGE.

[Written for the AMERICAN RAILROAD JOURNAL.]

RAILWAY managers often feel that in certain details of railway work subordinates lay too much stress upon unimportant points. Car-builders are frequently thought to be too particular about car-stock and its care and preservation. Many builders would like to have a large lumber yard well filled with timber, with stone foundations for the piles and sheds to cover the whole; this would be a most gilt-edged arrangement, and if a road had a million dollars idle on which it would be glad to realize two per cent., such a lumber yard would no doubt be a fair investment. It is hardly possible to explain the results obtained by the use of dry lumber to one who is not familiar with the subject. For this reason the car-builder, when urging the subject to the attention of his superior officers, labors at a disadvantage. His experience tells him that there is no comparison between green and dry timber, or between timber that has been dried under his own eye and that purchased in the market as dry. It is the difference between an iron and a steel rail with even more in favor of the dry timber than the steel rail. No firm and enduring construction can be made with green timber. It immediately begins to contract, the joints open and the whole structure lacks stiffness. No tightening up will entirely correct this, because timber shrinks in one direction only. Shrinkage changes the shape of the joints, reduces the size of the members, but not their lengths, and distorts openings that have been cut in them. Another evil arises from this shrinkage which is equally serious, and that is rapid decay. The joints opened by shrinkage cannot be closed even by tightening of bolts, and moisture penetrates. Whenever this occurs decay at once begins, and a frame which might be good for twenty years will rot out or lose its strength in six or eight. In the meantime the strength of the green timber work, whatever it may be, is much less than that of dry, it being impossible to frame in such a way as to bring the different members into harmony and make each bear its share of the load. In view of such facts it will be easily understood that even where a road does not intend to build its own cars, it is extremely important to have a yard in which timber and lumber of all kinds can be properly seasoned and protected from rain, snow and the sun.

The question to be decided is just how much expenditure will pay. If a road only builds at rare intervals, a large sum devoted to protecting its lumber will hardly pay. As long as it has to do its own repairs and build plows, cabooses and other special cars, it will pay to expend a moderate sum in establishing a lumber yard and building some sheds and other means of protection.

The following is an outline of what a railway manager can do at his principal car-shop, with economy: Select a spot of ground of sufficient size and surround it by a high and tight fence. A spot with good drainage should be chosen or else one that can be filled up with cinders. The ground must be kept free from water or dampness; this is essential. Tracks are to be laid so that every part of the yard may be reached by a switching-engine. If the yard can have two entrances so that side-tracks come into it from both ends, there will be an item of economy in many cases.

Foundations for the piles are best made of stone so as to raise the bents on which the piles rest eight or ten inches above the ground. If old car-sills are used instead of stone it will pay to coat them with coal-tar. The value of stone or of wood protected from the dampness of the ground is not due so much to the cost of the material as to the inconvenience and difficulty of replacing.

Every car-builder would like to see every stick of his timber under cover. While a complete covering for the lumber yard is no doubt desirable, the advantage of such a cover can hardly be said to pay interest on the capital invested. Although plenty of good reasons for building houses for shelter may be given, the manager may with safety refuse to put up many sheds. Some are needed in which to store certain kinds of stock; these should be good and the roof ought to be tight enough to deserve the name. Such sheds, located so as to act as a shelter from drifting storms for the rest of the yard, are a good investment. A good dry house of moderate size would in many cases be worth more than the sheds and cost less.

Without sheds the yards would be esteemed of small importance by most builders, but a yard without sheds may be made to supply better lumber than one having a few costly sheds and much exposed lumber. The money which is usually expended in building sheds can be better applied in putting a movable roof over every pile of lumber in the yard. The method by which this may be done is suggested by the farmer's hay-stack and roof. Four scantling are placed at the corners of the pile and a roof between them. The pitch of the roof is made to carry the water to the back of the pile. Such a roof can be lowered close to the lumber and will make a good shelter whether the pile is low or lofty. The protection obtained in this way is on the whole quite as satisfactory as that of a shed. The latter must be lofty, and having an open front gives very little protection to a small pile in a driving rain or snow-storm. On the other hand, a pile with the roof sitting close down upon it and having the ends of the timber painted is as well sheltered as in any shed. Light roofs on four posts are sometimes made stationary with very fair results. The protection is not quite as good as that of a movable cover, but the cost is less than a shed and somewhat less than that of a movable roof.

Protection of this kind costs very little, on and some roads in the middle states these temporary shelters have been built entirely from condemned lumber. The cost to the company was only for the labor and nails.

In stacking green lumber away it is well worth the expense to paint the ends so as to protect them from the weather and to prevent end-cracking to some extent. The cost of doing this is not very great, but the advantage is considerable, as may be seen by visiting any large yard. There is an apparently trifling point in regard to laying out a yard where the interference of a superior officer does much harm. The streets and piles ought not to be square with the points of the compass. Placed at an angle, say southeast, the sun has on opportunity at all seasons of the year to shine upon all sides of each pile and into all the spaces between the piles. Even practical men sometimes overlook this small but important matter.

After a suitable yard has been procured, the superintendent, general manager, or some person connected with the directorate of the road, is the only person who can utilize it in such a manner that the road shall gain the full benefit. Green lumber cannot be made dry and suitable for use in six months, nor in a year. Certain kinds of wood are improved by several years of drying. It is therefore necessary for stocks to be laid in a long time in advance of the time at which it is expected they will be needed. In the nature of the case the purchase of stock so long in advance should be directed from headquarters and not left to one who has little knowledge of the general policy of the company.

SMOKE-CONSUMING DEVICES FOR LOCOMOTIVES.

BY J. N. LAUDER.

[A Paper read before the American Forestry Congress.]

In presenting this paper on smoke-consuming devices for locomotives it is not my purpose to enter into the details of the mechanical construction of the various devices that have been experimented with in a practical way during the last thirty years—or to speak more accurately, ever since the locomotive was brought into existence—but to give in a general way what has been done in the past and what is being done at the present time to mitigate the evils of the discharge of unconsumed products of combustion from the chimney of the locomotive.

The smoke and sparks that are discharged from the locomotive are so annoying to passengers that on some of our lines a trip by rail on a hot day is something to be dreaded, and the danger to forests and other property from fires set by these sparks is in the aggregate enormous.

To the novice the remedy for all this would seem to be to so arrange the furnace that perfect combustion would take place. This may be done on stationary or marine engines, where heating surface enough can be provided to allow of slow and perfect combustion, but in the locomotive the weight and size of boiler is limited and artificial means must be used to provide for such rapid combustion as is required when the engine is developing its full power.

The attention of locomotive mechanics has been drawn to this question of fuel-combustion ever since the birth of the locomotive; but their efforts to make it perfect have been only partially successful, and while the heating surface of our boilers is so small in comparison with the requirements of the engines, a forced draft will have to be resorted to. This fact being recognized, it necessarily follows that when the engine is developing its full power the artificial draft is so strong that small particles of coal will be lifted from the fire and drawn through the flues unconsumed and discharged out of the chimney in the form of what is called sparks, The fact that some solid matter will be drawn through the flues from the fires being established, I will now briefly consider the various mechanical contrivances that have from time to time been brought forward to arrest and dispose of these solids.

Amongst the earliest contrivances (when wood was the universal fuel used in this country) was a chimney shaped like a funnel placed with the broad mouth upward. This broad end was covered with a wire-screen, and inside of this chimney was placed a straight pipe somewhat smaller than the smallest diameter of the chimney, its height being about two-thirds that of the chimney. Over this and near the wire-screen was mounted a deflecting plate with edges curving downward. A spark-

reservoir was placed in some suitable position near the smoke-box, and pipes were made to lead from the annular space between the chimney and and the inside pipe to this reservoir. The operation of this arrangement was as follows: The unconsumed products of combustion that were drawn through the flues were driven by the exhaust steam upwards against the curved deflector at the top of the chimney, and the larger and heavier particles were forced down into the spark-reservoir. The lighter particles would pass to the atmosphere through the wire-screen, but would rarely have life enough to set anything on fire. The reservoir, however, was soon abandoned, as it was found in practice that with wood for fuel the sparks were so reduced in size by friction in their passage through the flues and chimney that they could all pass through the screen to the atmosphere with little danger of setting fires.

When coal came to be used as fuel the old arrangement of chimney was found to be unsuitable and new applicances had to be devised, A new and annoying element had to be met—that of gas and smoke, caused by imperfect combustion in the furnace. When fresh coal is added to the fire a vast quantity of gas is evolved, and unless a sufficient quantity of atmospheric air is brought into immediate contact with it it will pass off in the form of smoke.

Various plans to furnish the requisite amount of air, and at the proper time, have been tried; but the varying conditions under which the engine is working have so far made them practically failures.

Letting air into the furnace over the fire, while it will prevent the formation of smoke if let in in sufficient qantity, will also lower the steam-producing qualities of the boiler. Air mixed with a jet of steam driven into the furnace over the fire has been tried at various times and in various ways, but it has always ended in failure. D. K. Clark, the eminent English engineer and author, in his work on the locomotive, describes a method of injecting air and steam mixed, into the furnace of a locomotive boiler to promote the combustion of the gases. Recent so-called inventions brought out in this country are almost exact duplicates of appliances described by Clark long ago.

Rotary blowers have been used to drive the products of combustion from the smoke box back to and into the furnance, to be subjected to a reburning process, but such methods never got beyond the experimental stage. Double or twin furnaces have been tried, but while producing good combustion the mechanical difficulties to be overcome have thus far interfered with their success. Mechanical devices in various forms for driving the solid, unconsumed products of combustion from the smoke-box back through suitable tubes to the furnace were several years ago quite largely used, but they have nearly all given way to more modern and better methods.

I will now proceed to discuss the most improved methods of promoting combustion and also the mechanical means employed to prevent the escape of sparks from the chimney. And hear let me say, curious as it may seem, that wonderful discoveries made in the last twenty years in the production of steel have a direct bearing on the question under discussion.

The substitution of steel for iron in rails and tires has made it possible to so increase the weight of the locomotive that larger boilers can be used, and therefore a very much greater heating surface in proportion to the cylinder area. This fact makes it possible to do what could not be done were soft iron rails and tires still in use.

The modern locomotive boiler has little to distinguish it from its prototype of thirty years ago. All combustion-chambers, water-tables and complications of all kinds have been discarded, and we have the plain rectangular furnace, with plenty of tubes to freely carry off the products of combustion. Its leading feature is its size and large heating surface. Its enormous evaporative power will be recognized when I say that this boiler, when pushed to its full capacity, will convert three thousand gallons of water per hour into steam. To accomplish this amount of work on a grate surface of only eighteen square feet, very rapid combustion must be maintained and this can only be done by a forced draft. A forced draft means imperfect combustion, and imperfect combustion means particles of unconsumed coal drawn through the tubes. These unconsumed solids must be arrested in their course to the atmosphere and deposited in receptacles where their presence will not be harmful. The smoke-box is made twice the usual length; a coarse wire screen is drawn across high enough to be above all the boiler flues; the chimney is a plain, open pipe, smooth aud free from obstructions. The exhaust pipes are carried up through the screen, terminating in a single nozzle. In front of the flues a deflecting plate is placed at a suitable distance from the ends of the flues, and is set at an angle of about twenty degrees. The functions of this plate are two-fold; first, it equalizes the draft through the flues, and second, it deflects the sparks downward, and instead of their being shot upward through the chimney they are banked up in the forward end of the smoke-box, there to remain until they are removed at the end of the trip. In the furnace is placed a fire-brick arch extending entirely across the furnace, and from the flue-sheet under the flues back about two-thirds of the length of the furnace. The gases as they arise from the coal are forced to travel back and over this arch on their passage to the flues, and by the delay thus caused, and also by their contact with the intensely hot fire-brick composing the arch, are very thoroughly consumed. The unburned solids lifted from the fire are also prevented from being drawn directly into the flues, the force of the draft caused by the exhaust steam in the chimney causing them to impinge against the hot brick, where the heat is so intense that a large percentage of them are consumed that would otherwise be drawn through the flues in a solid state. The brick arch is supported on four iron tubes, placed diagonally in the furnace, connecting the water-space under the flues with the water over the furnace crown. These tubes not only make a reliable support for the brick, but best promote the circulation of the water in the boiler.

The arrangement of smoke-arch described is not of recent design, but was patented in substantially its present form about twenty years ago by Mr. John Thompson, of East Boston, who was then connected with the Eastern Railroad in the capacity of master mechanic, It was tried thoroughly by him at that time, but was abandoned for the reason that a comparatively few miles' run would

fill up the smoke-arch with sparks and so interfere with the draft that the capacity of the boiler to generate steam in sufficient quantities to supply the wants of the engine was destroyed. The small furnaces used at that time and the powerful artificial draft made necessary thereby produced this result.

As I stated in a former paragraph, the introduction of steel for rails and tires made the use of larger boilers possible, and with their introduction came the successful use of the spark consuming and arresting devices described. The railroad with which I am connected has had these appliances in use on a limited number of engines for the past two years, and in no case has a forest or other fire been set by them, and if kept in proper order I believe they are absolutely safe.

In conclusion I wish to say that careful and intelligent manipulation of the fire by the fireman is imperative, and will do more to prevent the formation of smoke than any mechanical contrivances.

RAIL PRODUCTION AND CONSUMPTION.

THE statistics of the steel industry of the United States, collected and compiled for the American Iron and Steel Association by its vice-president and general manager, Mr. James M. Swank, is remarkable as showing that the production of Bessemer steel ingots in 1885 was larger than ever before, though the steel rail production then was the smallest for five years. What this means, of course, is that the use of steel for other purposes than rails is making rapid progress. How great this progress is may be gathered by a comparison of the production of Bessemer ingots and rails in successive years, as follows, in tons of 2,240 pounds:

	Ingots.	Rails.	Excess of Ingots.
1874	171,370	129,414	41,956
1875	335,283	259,699	75,584
1876	469,639	368,269	101,370
1877	500,524	385,865	114,659
1878	653,773	491,427	162,346
1879	829,439	610,682	218,757
1880	1,074,262	852,196	222,066
1881	1,374,247	1,187,770	186,477
1882	1,514,688	1,284,067	230,621
1883	1,477,346	1,148,709	328,637
1884	1,375,531	996,983	378,548
1885	1,518,488	959,470	559,017

It is true that the excess of ingots cannot be taken as an absolute measure of the use of Bessemer steel for other purposes than rails, first, because there is some waste in rolling rails from the ingots, but chiefly because in some years, especially in 1880, 1881 and 1882, large quantities of Bessemer rails have been made from imported steel, as might be suspected from the fact that the rails were 77 per cent. of the ingots in 1877, 75 per cent. in 1878, and 74 per cent. in 1879, and in the next three years 79⅓, 86⅓ and 85 per cent., respectively. But since the imports of the materials for Bessemer rails have virtually ceased, in the last three years, the percentages have been 78, 72½ and 63 per cent., respectively—that is, barring the waste in rolling rails, 22, 27½ and 37 per cent. of the Bessemer production of the last three years has been taken for other uses than rails, and last year the takings for these other uses were 70 per cent. greater than in 1883.

This increasing use of steel was due to a very important extent, probably, to the great fall in the price, so that in the first eight months of last year the Bessemer steel was as cheap or cheaper than iron. The increase in the price of rails since has been so much greater than the increase in iron that there is not now the same inducement to substitute steel for iron, though preparations for making such substitutions were never so general.

It will be seen from the above table that the Bessemer rail production last year was 3¾ per cent. less than in 1884, and 25¼ per cent. less than in 1882, when it was largest. These figures do not show the whole decrease in rail production, however, because the production of rails other than Bessemer almost ceased last year. For eight years the production of each kind and the total have been in tons of 2,240 pounds:

	Bessemer steel.	Open hearth steel.	Iron.	Total.
1878	491,427	8,390	288,295	788,112
1879	610,682	8,169	375,143	993,994
1880	852,196	12,156	440,859	1,305,211
1881	1,187,770	22,515	436,233	1,646,518
1882	1,284,067	20,326	203,459	1,507,852
1883	1,148,709	8,201	57,995	1,214,906
1884	996,983	2,384	22,821	1,022,188
1885	959,470	1,250	13,118	973,838

Thus our total rail production last year was the smallest since 1878, and indeed was not very much greater than in 1872 (892,857 tons) when nine-tenths of it was iron. The decrease from 1884 to 1885 was only 4¾ per cent., however, and the amount of decrease was equivalent only to 550 miles of track of 56-pound rails, while the decrease in new railroads constructed was about 825 miles. The new railroads, however, probably did not require much more than 315,000 tons last year, or less than one-third of the total production, leaving 659,000 tons for the maintenance of the 125,000 miles of road and 156,000 miles of track in operation at the beginning of the year, which would permit the renewal of about 3 per cent. of it only.

This seems a very inadequate quantity at first sight but it must be remembered that 49,000 miles of this track had been laid since about the middle of 1880, and by far the greater part of it of steel, so that very few renewals of this could be expected so soon; and we must also remember that at the end of 1885 more than 90,000 of the 156,000 miles of track were steel, all but a small part less than ten years old (because revious to 1875 the total production and imports of steel were only about sufficient for 10,000 miles of track) and that what iron was left was on the lines and parts of lines which suffer the least wear. Nevertheless, it is noticeable that the 66,000 miles of iron track at the beginning of 1885 must have been more enduring than it is usually credited with being, since the total consumption for renewals during the year was but 10 tons per mile of this track, even if no steel track whatever had been renewed—evidence that iron is enduring when it is not much tried. Probably four-fifths or more of the whole gross tonnage movement of the country is over the 58 per cent. of steel track. Evidently most of the iron in track at the beginning of last year was old, because the total supply of iron rails since 1874 had been less than 3,300,000 tons, or about 37,300 miles of track, and for the last six years of that period had been 1,832,304 tons, or about 20,650 miles of track. Thus more than 29,000 miles of the iron track must have been more than ten years old and 45,000 more than six years old. This will all be renewed with steel finally, and probably within a comparatively few years. Indeed, the large orders for steel rails which within a few months have set the steel mills actively at work and advanced the price of rails

from $26.50 to $34.50 are doubtless due chiefly to the need of renewing much of this old iron together with considerable old steel track.

The renewal of one-fourth of the iron track which is more than ten years old will require something like 615,000 tons of rails per year, and this would seem to be a moderate requirement; for though the iron rails are almost exclusively on roads of thin traffic, they are not to any great extent on the roads in new country, having been laid for the most part more than ten years ago, and of course not all by any means on new road then. It is not probable that there are many roads built more than ten years with traffic so light that it will not wear out iron rails, of the wretched quality usually procurable ten years ago, in 14 years.

Doubtless this old iron is mostly on roads which have not only a light traffic, but light locomotives; and where the latter are light enough a very long life for iron rails is still possible; but the light locomotives tend to disappear quite rapidly, though they may last and be the most economical motive-power for a long time yet or even permanently on some of the lines where they have taken refuge and over which there is scarcely ever necessity or possibility of hauling a heavy train.—*Railroad Gazette.*

The Most Northerly Railway in the World.

IN the report of Consul General Mitchell on the trade of Norway, it is stated that the Ofoten-Lulea Railway, which will, when completed, greatly influence the future of the iron trade of Europe, was commenced last summer at Lulea, on the Gulf of Bosnia, and has made very considerable progress. The contractors confidently expect to have the first section, Lulea-Gellivara (one-third of the entire railway) completed and opened for traffic by the end of 1886. The commencement of work at the Norwegian terminus has been delayed a year, in consequence of a disagreement as to the site of the terminus at Ofoten, necessitating fresh surveys being made. These have now been completed, and the plans, etc., of the Norwegian portion of the line deposited with the Norwegian Government, upon the approval of which work at Ofoten will be commenced. The site chosen for the terminus at Ofoten is on the west shore of Narvig Bay, a commodious and well-sheltered natural harbor at the bottom of the Ofoten fjord, and within a few hours' steam of the famous Lofoten cod fisheries. On account of the influences of the gulf stream, the Ofoten fjord is navigable throughout the year. The length of the Norwegian section of the line is only 28 miles. It will cross the Kjolen Mountains, at the frontier at an elevation of 1,600 feet above sea level. On the Norwegian side the country is very wild and mountainous, but the engineers anticipate no difficulties of an unusual nature either as regards the nature of the country, the severe climate, or the snow. This railway, when finished, will be the most northerly railway in the world.

The railway is being built by English engineers, contractors for the Northern of Europe Railway Company (Limited), which was formed in London in 1883, with an authorized capital of £1,500,000 in shares, and £1,500,000 in debentures. The railway has been most favorably regarded in Scandinavia, except by the Swedish iron-masters, who have opposed it from the first, although the export of these iron ores from Lapland can hardly influence the Swedish iron industry, but could rather compete with the interior Spanish ores from Bilbao.

Economy of Fuel.

THERE is no question that the application of many mechanical devices to locomotives is calculated to effect a saving in fuel, says the *National Car-Builder*. Steam is not used so economically that less could not be made to do the work now done by a greater quantity, and there might be many improvements introduced that would reduce the temperature of the gases being passed into the atmosphere. Skill, ingenuity and perseverance are, however, required to apply the forms of improvement indicated, and great difference of opinion may rationally exist among accomplished mechanical engineers, as to the probable effect of structural changes proposed with the view of promoting economy of heat. But there ought to be no room for difference of opinion about the desirability of accomplishing saving, when all the changes to be effected are the introduction of the means of keeping an accurate record of fuel consumed. It is merely a slight change of method to keep the record of fuel consumed and work done by *enginemen* instead of *engines*, but the curtailment of waste that results from this change is by no means slight.

There is no line of economy in railway management at the present day that promises results equal to that of stopping the rushing leaks resulting from senseless waste of fuel in locomotive firing. We know of no plan that will stop the leakage so effectually as the introduction of the premium system of coal accounts. Putting on traveling engineers well acquainted with the proper methods of firing and fuel-saving might do some good if these engineers would insist on their methods being followed. But it is an excessively difficult matter to get enginemen to change the free and easy style they have been brought up to, and which takes no thought of any higher duty than that of getting over the road comfortably. The proper and only effectual mode of inspiring the enginemen with zeal for fuel-saving is to make them pecuniarily interested in its results.

Metallic Railway-Ties.

AT a recent meeting in Paris of the French Society of Civil Engineers, a paper by M. Post, of Holland, upon metallic railway-ties was read. According to M. Post the principal advantages inherent in the new system, based on actual trial of about twelve years in Germany, etc., were:

1. The average durability of the ties remaining in the track after twelve years' use is much greater with metallic ties of good design than with the best wooden ties.

2. Safety is better guranteed, as the gauge is better preserved.

3. The expense of maintenance is decreased after the second year of the service.

4. The system is rapidly perfecting, so that the fastenings are made absolutely certain and less expensive for

repair and maintenance than fastenings used with wooden ties.

5. The value of the metallic tie when worn out in the service is much greater than the value of an old wooden tie.

In summing up these advantages and combining them with the actual cost of purchase, redemption and interest, M. Post concludes that no country can exclusively use wood for this purpose with true economy; and he cites Holland as proof of his assertion, where wood is still easily obtained, and iron is not too plentiful. He says all Holland companies have adopted the metallic tie.

Railway Mileage in Canada.

BELOW will be found a statement of the mileage of the various railways in Canada in operation on the first of January of this year, as nearly as can be ascertained by the new Canadian journal, *Railway Life* With few if any exceptions these road are all standard gauge. As will be seen, the mileage will compare favorably with that of any other country in the world, considering the difference in population. The names of the roads are arranged in alphabetical order and are as follows:

	Miles.
Albert Railway, N. B.	45
Bay of Quinte Railway Navigation Company.	15
Canada Atlantic Railway	135
Canada Pacific Railway	3,678
Carillon and Grenville	13
Central Ontario	104
Chatham Railway, N. B.	9
Coburg, Peteboro' and Marmora Railway	15
Cumberland Railway, N. S	32
Eastern Extension Railway	90
Elgin, Petitcodiac and Havelock Railway, N. B.	14
Erie and Huron Railway	36
Grand Southern Railway, N. B.	82
Grand Trunk Railway	2,694
Intercolonial Railway	830
International Railway, Quebec	69
Kingston and Pembroke Railway	61
Manitoba and North Western Railway	130
Michigan Central, Canada Southern Division	376
Napanee, Tamworth, and Quebec	28
New Brunswick Railway	397
Northern and North Western Railway	382
Prince Edward Island Railway	196
Quebec and Lake St. John Railway	46
Quebec Central Railway	148
St. Martins and Upham, N. B.	30
South Eastern	185
Western Counties Railway, N. B.	67
Windsor and Annapolis Railway	130
Total	10,027

In addition to those roads in operation there is a considerable mileage on which track has been laid, and which will be open for traffic in the course of a few months, and there will undoubtedly be at least 11,000 miles of railway in operation in Canada by the first of July next.

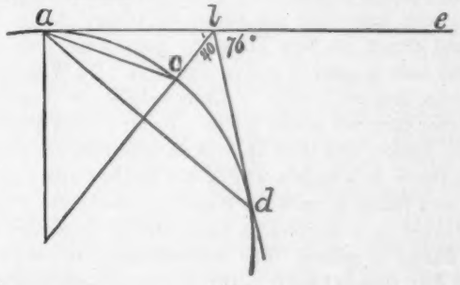
Joining the Volga and the Don.

ACCORDING to *Engineering*, a group of French and Russian capitalists are seeking from the Russian Minister of Finance a concession for cutting a canal between the rivers Volga and Don. These two mighty streams penetrate in their course through Russia within fifty miles of each other, at Tsaritzin, and then strike off, one to the Black sea aud the other to the Caspian. The promoters of the undertaking seek, by the construction of the canal, to give the extensive commerce of the Volga an outlet into the Black sea. The physical difficulties are not insuperable, although sufficiently severe to test the resources of any except a very powerful syndicate. The idea of the canal is by no means new, Peter the Great having personally gone over the ground and made a rough scheme for one. His successors, however, in spite of their enterprise in canal making, have always been averse to the undertaking. In the flood season both rivers are unmanageable, and it has been thought that if a canal were cut, the Volga might some spring burst in the Don, and cause a catastrophe. Of course, with engineering skill, it would be easy to prevent this fear of timid ministers being realized; but it is interesting to mention that nature herself is preparing the way for some such eventuality, the Volga yearly cutting more and more into its west bank and thereby drawing nearer the Don. At present the two rivers are connected by a railway, described by Mackenzie Wallace as the slowest, worst laid, and most infamous in Europe. The traffic is not very large, and even the promoters of the canal project do not think they could carry out their project without a considerable subsidy from the State.

A New Rule for Running Railway Curves.

THE following rule for running curves on railways is sent to the JOURNAL by Mr. Charles Seymour, of Palestine, Ill., chief engineer of the Bloomfield Railroad. Mr. Seymour writes: "I have used this rule with great advantage where the original line has been badly run. To get my data I intersect tangents, bisect the contained angle and run on the bisecting line to the crown of the curve, measuring the distance accurately. The rule may not be new, but I have not seen it anywhere myself."

Given secant — radius — $b\ c$, and total angle of curvature $e\ b\ d$, to find tangent $a\ b$ and radius.



RULE.

As sin angle $e\ b\ d \div 4$ is to $b\ c$, so is sin angle $180° - (e\ b\ d \div 4 + a\ b\ c)$ to tangent.

As sin angle $e\ b\ d \div 2$ is to tangent, so is sin angle $a\ b\ c$ to radius.

$5730 \div R$ = degrees of curve for 100 feet.

Let angle of curvature = 76°.

Let secant — radius = 40 feet. Thence,

Sin 19° : 40 : : sin 109° : tan = 116.2

Sin 38° : 116.2 : : sin 52° : radius = 148.7

Degree of curve for 100 feet = 5730 ÷ 148.7 = 38° 3′

Log. sin 109° = log. sin 71° =	9.975670	Log. sin 52° =	9.896532
Log. 40 feet =	1.602060	Log. 116.2 =	2.065088
	11.577730		11.961620
Log. sin 19° =	9.512642	Log. sin 38° =	9.789342
Tangent 116.2 =	2.065088	Radius 148.7 =	2.172278

French Opinion of American Locomotives.

A FRENCH work on American railways says: "The style of construction peculiar to American locomotives is not calculated to reduce the fuel consumption to that of European locomotives. The small proportion of heating-surface due to short tubes is as little qualified to utilize

the heat produced by means of large grates as the very restricted use of expansion in the cylinders is to obtain the maximum work from the steam. Consequently, it is not surprising that, while an average of thirty-five pounds of coal per locomotive mile is not considered slow in France, American locomotives still average about fifty-six pounds."

The Introduction of Railways.

THE following are the dates of the introduction of railways in the various countries from 1825 to 1860:

England	September 27th, 1825
Austria	September 30th, 1828
France	October 1st, 1828
United States	December 28th, 1829
Belgium	May 3d, 1835
Germany	December 7th, 1835
Island of Cuba	In the year 1837
Russia	April 4th, 1838
Italy	September, 1839
Switzerland	July 15th, 1844
Jamaica	November 21st, 1845
Spain	October 24th, 1848
Canada	May, 1850
Mexico	In the year 1850
Peru	In the year 1850
Sweden	In the year 1851
Chili	January, 1852
East Indies	April 18th, 1853
Norway	July, 1853
Portugal	In the year 1854
Brazil	April 30th, 1854
Victoria	September 14th, 1854
Columbia	January 28th, 1855
New South Wales	September 25th, 1855
Egypt	January, 1856
Middle Australia	April 21st, 1856
Natal	June 26th, 1860
Turkey	October 4th, 1860

An Interesting Relic.

THE driving-wheels of the first locomotive engine built in this state, and the third one constructed in America, have been sent from the shops in Albany to the Grand Central depot in New York, for preservation as a relic. On the hub of each in yellow letters is "De Witt Clinton, first trip, August 9, 1831." Each weighs 350 pounds. In diameter they are about 5 feet. From a solid hub in the center, spokes less than an inch in diameter are set, similar to those in a wagon-wheel, but further apart, and extend to a felloe ½ inch thick and 3 inches wide. On the outer edge is a serious of holes which originally held a steel flange in place. The workmanship is crude compared with that of to-day. The driving-wheels now turned out at West Albany weigh 1,900 pounds each, without the tire, or more than five times as much as the wheels of the "Clinton," which was the first engine that made a trip in this country, both of its predecessors breaking down. The engine was kept as a relic in the repair shops at West Albany until ten or twelve years since, when it was broken up and the copper and brass sold to locomotive works.

Economy of Feed-Water Heaters.

THE saving of fuel effected by a good feed-water heater is astonishing, says an exchange. Assuming that boilers are required to furnish 100 horse-power for 10 hours per day for their reasonable life, say 15 years, and that 4 pounds of coal are required per horse-power per hour, and we assume 300 working days per year, which will be 4,500 days for 15 years, then 100 horse-power at 3 pounds per hour is 4,000 pounds of coal per day of 10 hours, and 18,000,000 pounds for the 15 years, which at ¼ cent per pound is $45,000. Now suppose we can save a paltry 5 per cent. of this (there are many who would not consider this worth looking after, and we get $2,250, enough to buy nearly 200 horse-power of boilers; then call it 500 or 1,000 horse-power, and the saving would be $11,250 and $22,500, enough for 50 horse-power for 15 years. The amount of fuel that can be saved by heating the feed-water by the exhaust-steam is shown by the fact that 1 pound of water must be converted into steam to heat about 5½ pounds from 32° up to 212°.

Therefore, 100 horse-power, at 30 pounds of water evaporated per hour per horse-power, would be 3,000 pounds per hour, and 30,000 pounds for 10 hours; and to raise this water from 32° to 212° will require 1 pound additional for every 5½ pounds, and we get 5,545 pounds of water to be evaporated in excess of what would be needed for 100 horse-power if the water was heated up to 212° by the exhaust-steam from the engine; and if the boilers would evaporate 7 pounds of water from 32°, under 70 pounds pressure to 1 pound of coal, we should have to evaporate without the heater 35,545 pounds of water; and this divided by 7 gives 5,097 pounds of coal required in this case, and with the heater 30,000 pounds of water to be evaporated; this, divided by 7, gives 4,285 pounds of coal—a saving of 792 pounds of coal for 100 horse-power, 10 hours—about 15 per cent., which is not quite accurate for these conditions, but very near it, and is the simplest way to show to all the advantages of heating feed-water by the exhaust-steam from the engine. This should awaken those who are pumping cold water into their boilers, or heating it by steam taken directly from the boilers, to the advantage and saving of fuel by using a good feed-water heater. To this direct economy in fuel should, moreover, be added the saving effected by purifying the water.

Locomotives in Italy.

THE following figures, taken from a paper contributed to the Institution of Civil Engineers, shows the number of locomotives placed upon the principal lines of Italy, and the countries where they were constructed:

	Germany, Austria, Switzerland.	England.	France and Belgium.	Italy.	Total.
From 1847 to 1865....	36	245	334	87	702
" 1866 to 1875....	80	40	267	83	470
" 1876 to 1885....	322	36	7	171	536
Total	438	321	608	341	1,708

There are only three firms in Italy which make locomotives, and one of these has recently become bankrupt. An average of 17 locomotives per annum divided among three firms does not seem to indicate any great pressure of business in the Italian locomotive-building trade. The Germans appear to have the greater part of what business there is, but even their contribution only amounts to 32 engines per annum.

A Once Famous Car.

A PARTY of young gentlemen of this city, says the *Albany Express*, journeyed to Poughkeepsie, and being desirous of relieving the monotony of a long ride, repaired to the smoking-car. It was an old-looking vehicle and despite its age and palpable wear and tear it still retained some evidence of former grandeur. The young men noted

this, and one of them remarked to the conductor that "it was a queer kind of a caboose for a smoking-car." "You're right," returned the ticket-gatherer, "I'm sorry to see the old girl come to such a pass as this. It was upon this car that the body of President Lincoln was carried from Albany to Buffalo, upon the occasion of that memorable funeral in 1865. But in one way we keep the recollection of that sad event vividly impressed upon our memories. In one end of the car we have a large photograph of Washington, and in the other one of Lincoln. Both are entwined in flags, and the upper parts of the car are appropriately decorated." "What's the number of the car?" queried one of the excursionist. "No. 450, and she's attached to the two o'clock local to Poughkeepsie every day."

Locomotive Running Average.

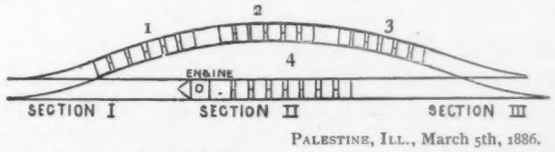
THE prevailing tendency to lengthen locomotive running average considerably above the 90 to 100 miles, which used to be considered about the proper thing, is well illustrated by the locomotive divisions on the Canada Pacific, of which there are 19 on the 2,445 miles between Montreal, an average run per locomotive of 128¾ miles. The shortest and longest runs are:

4 of 112, 113, 114 and 116	miles respectively.
2 of 118	" "
4 of 120, 125 and 126	" "
6 of 130, 131, 133, 133, 134, 134	" "
1 of 145	" "
2 of 150, 152	" "

Thus the minimum is 112 and the maximum 152 miles.

Solutions to the Second Problem in Car-Drilling.

THE following solutions to the problem in switching and car-drilling given in the February JOURNAL have been received. As shown in the accompanying cut, the siding is entirely occupied by three trains, each containing a number of cars, which trains are numbered 1, 2 and 3. The engine is standing on section II of the track with a train of a number of cars, which train is numbered 4, and the engine can move but one train at a time. The problem is to transpose trains 2 and 4, leaving trains 1 and 3 in their original positions, and without making flying switches.



PALESTINE, ILL., March 5th, 1886.

Editor American Railroad Journal:

DEAR SIR.—I offer the following solution to your problem for switching and drilling cars in the February number:

1. Push train 4 well back on section III.
2. Run engine over section II and section I onto siding.
3. Pull out and back up train 1 ahead of train 4 on section III.
4. Pull back train 3 onto section III and push onto section I.
5. Run back over section I and section II to section III, and pull train 1 onto section II.
6. Run engine onto section I back into siding, and push train 2 onto section III ahead of train 4.
7. Push train 1 onto section I back of train 3.
8. Run back through siding and pull train 2 from section III onto siding.
9. Run ahead onto section I, back down section I and section II to section III, and pull up train 4 onto section II.
10. Run back section I onto siding, and push train 2 back onto section III.
11. Run through siding to section I, and pull train 1 onto siding.
12. Run back to section III and ahead to section II, and pull back train 4 to section III, and push it onto siding, next to train 1.
13. Run back to section III, and ahead through section II to section I, and pull back train 3 to section III, and push it ahead onto siding, next to train 4.
14. Finally, run back onto section III, and pull up train 2 onto section II, as proposed.

Very truly yours,

CHARLES SEYMOUR,
Chief Engineer, Bloomfield Railroad.

MONSON, ME., March 6th, 1886.

Editor American Railroad Journal:

DEAR SIR.—I herewith send you solution of problem in switching in the February JOURNAL:

1. Put train 4 on section III.
2. " " 3 " " I.
3. " " 4 " " II.
4. " " 1 " " II.
5. " " 2 " " III.
6. " " 4 " " I.
7. " " 1 " siding
8. " " 4 " "
9. " " 3 " "
10. " " 2 " section II.

Yours truly,

T. P. ELLIOTT,
Station Agent, Monson Railroad.

Both of the above solutions are correct, although the second would have been easier of comprehension if more amplified.

Other interesting problems in switching and car-drilling will appear in the JOURNAL from time to time.

FOR many years, and until recently, Greece had only one railway and that only six miles long, from Athens to its port at Piræus. An extension of this line to Corinth, about fifty-five miles, was opened in April last, and now a further extension of twelve miles on the way to Patras is opened. This would have been right handy some 2,500 years ago for Athenians visiting the Olympian games. Another, with the classical name of "Corinth, Argos and Nauplia Railroad," is nearly ready for traffic.

THE German raw iron trade has evidently not suffered as severely from lack of demand as that of England and of the United States. Returns just issued by the Association of Germany Iron and Steel Manufacturers show that during September the production of Germany, inclusive of Luxemburg, was 309,243 tons. The production of September, 1884, was 294,330 tons. From January 1st to September 30th, 2,806,322 tons were produced against 2,678,953 tons in the same period of 1884.

THE Boston and Maine Railroad Company has placed a special car, fitted with grooved iron tracks and pins and blocks to chock the wheels of a steamer, at a disposal of the Salem fire-department. It is to be constantly kept beside the depot-platform recently built by the company, to facilitate loading a steamer to send out of town in case of an appeal for help.

THE German Society of Mechanical Engineers offers a premium of 1,000 marks for the best plan for a boiler-shop, in which sixteen locomotive-boilers can be constructed at once; also, a premium of 300 marks for an essay on the best method, according to present experience, for fastening tires on railway rolling-stock.

THE *Organe des Mines* states that the paper rails now being made at St. Petersburg have proved to be extremely durable, while they cost one-third less than those made of steel.

American Railroad Journal.

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(ESTABLISHED IN 1831.)

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Principal Contents of this Number.

CONTRIBUTIONS.

(*Written for the American Railroad Journal.*)

Increase of Speed in Passenger-Trains—By William S. Vest 367
Railway Medical Service—By S. S. Herrick, M. D. Second Series.—The United States. VI. The Baltimore and Ohio Railroad Co..... 368
Railway Lumber Yards—By W. E. Partridge..... 370
Uniforming Conductors and Drivers—By F. Martin Gayler (Street-Railway Department)..... 381

EDITORIALS.

A Grateful Retrospect 378
The Pennsylvania's Relief Department..... 379
The Question of Railway Taxation..... 379
Editorial Notes..... 380
The Recent Strike (Street-Railway Department)..... 381

MISCELLANEOUS AND SELECTED.

Smoke-Consuming Devices for Locomotives—By J. N. Lauder. A Paper read before the American Forestry Congress..... 371
Rail Production and Consumption..... 373
The Most Northerly Railway in the World..... 374
Economy of Fuel..... 374
Metallic Railway-Ties..... 374
Railway Mileage in Canada..... 375
Joining the Volga and the Don..... 375
A New Rule for Running Railway Curves..... 375
French Opinion of American Locomotives..... 375
The Introduction of Railways..... 376
An Interesting Relic..... 376
Economy of Feed-Water Heaters..... 376
Locomotives in Italy..... 376
A Once Famous Car..... 376
Locomotive Running Average..... 377
Solutions to the Second Problem in Car-Drilling..... 377

STREET-RAILWAYS.

The Recent Strike (editorial)..... 381
Uniforming Conductors and Drivers—By F. Martin Gayler..... 381
Diseases Common to Car-Horses and Their Treatment. Report of the Special Committee to the American Street-Railway Association (concluded)..... 382
The Electric Elevated Railway in St. Louis..... 386
A New Use for Street-Railways..... 386
Inspecting Cable Roads..... 386
Street-Railway Notes..... 386

NEW INVENTIONS.

Vogel's Railway Telegraph..... 387
McAllister's Car-Coupling..... 388
Hunter's Street-Car Heater..... 388
De Mier's Electric Alarm-Signal for Railway-Cars..... 390
Campbell's Snow-Sweeper..... 391
Taggart's Car-Coupling..... 394
Pitcher's Spark-Arrester..... 395
Ries' Automatic Alarm, Signaling and Safety Devices for Railways... 396
Newton's Steam-Trap..... 399

A GRATEFUL RETROSPECT.

WITH the present number the AMERICAN RAILROAD JOURNAL closes its fifty-ninth volume. Less than two years since it passed into the control of its present management, and its history during that period has been a steady record of progression. At the time of transfer the future of the publication seemed doubtful. It lacked a special of field its own and it numbered scores of rivals. The character which it then possessed, and which to some extent it had possessed ever since its establishment in the dim past, 'way off in 1831, was not suited to the times. The daily press furnished amply all financial news relating to railways, and a monthly publication could in vain hope to acheive success as a record of finance, when its "news" had appeared weeks before in the newspapers. Nearly all of the fields of special railway industries and departments had been furnished with publications devoted exclusively to them, and the JOURNAL lacked a *raison d'etre*—if we may be pardoned for employing a foreign phrase which has no English equivalent.

After serious deliberation it was decided to enter a new field and publish the JOURNAL as a monthly railway magazine and review, containing contributions from able writers and railway experts on the live topics of railway progress, embracing all departments of the service—managerial, mechanical and constructional—such contributions to be written simply and tersely, and in a style that would meet with appreciation in both the railway office and the railway shop. The editorial department of the JOURNAL was to be conducted on similar principles, avoiding the discussion of abstruse financial questions and dwelling on the subjects of interest to railways that are daily presented. In addition it was resolved to reprint a selection or two from the JOURNAL'S contemporaries in each number, and also the papers read before the various railway associations, together with a number of brief items of general railway interest. In other words, it was the aim of the new management to publish a journal which should be essentially a railway publication yet in no way technical—a happy medium between the ordinary magazine and the special exponent of a single branch of railway science.

Our success—to speak in the first person—has been most gratifying. The JOURNAL'S subscription list has greatly increased, it reaches a wider field than ever before, its staff of contributors is steadily enlarging, and letters speaking words of praise and encouragement are daily received. With the greatest good-will to our contemporaries we have received none but the kindest words in return, and we have the satisfaction of knowing that the JOURNAL is steadily winning its way. Among its regular readers are to be found the most prominent railway men in the country, and its successful future in its

chosen field as a railway magazine and review is now firmly assured.

During the past year, embracing the closing volume, we have published in all forty-eight contributed articles on subjects directly appertaining to railways, and almost as many editorials on appropriate topics. An examination of the table of contents for the year, which prefaces this number, will show that the field covered has been a varied one, and that no branches of railway industry have been neglected. In addition, nearly two hundred of the most meritorious railway inventions have been described at length, and we have reason to know that this department has met with great favor both from the inventor and from the reader. The Street-Railway Department, while in a measure separate from the remaining departments, has been conducted in the same spirit and with the same aims, and the JOURNAL is recognized as the faithful and consistent exponent of street-railway interests.

With the April number we shall commence Volume 60, and during the progress of that volume, while the general character of the publication will remain unchanged, many new features will be added. Suggestions as to appropriate topics for discussion are always welcome, and we hope to make the JOURNAL a commonwealth where every reader shall take a personal interest in its contents. We are willing to be judged by our works and with thankful appreciation of all the favors bestowed by the JOURNAL'S many friends in the past, we turn with renewed energy to the inauguration of a new volume.

THE PENNSYLVANIA'S RELIEF DEPARTMENT.

INSTEAD of maintaining their original stand and forcing the provisions of the Pennsylvania's recently inaugurated relief department upon its employés, irrespective of the latter's inclination and wishes in the matter, the management of the road has with sound good sense modified the regulations of the department and requested a free opinion on the part of its employés as to their views on the subject. The result of this action on the part of the management will be two-fold. In the first place, the employés will realize that the department was inaugurated solely for their benefit, and that the company is not only willing to carry out its philanthropic intentions to the utmost, but to do so in the manner most agreeable to the intended beneficiaries; and secondly, having been consulted, and feeling that the success of the department will in a great measure redound to their own credit, it is safe to assume that the employés will enter warmly into the project and coöperate with the management of the road in making the department a lasting source of benefit.

In its fullness and minuteness of detail, and in the range and extent of proposed benefits, the Pennsylvania's relief department is superior to that of any other road, with the single exception of the relief department of the Baltimore and Ohio, which is described at length by a contributor in this month's JOURNAL; and the wise and common-sense action of the management in consulting the wishes of the employés will insure its success. There is a time to be stiff-backed and a time to yield gracefully, and the management of the Pennsylvania has rightly concluded that the present occasion was one where it could yield without loss of dignity. The wisdom of this course will soon become manifest in the cordial coöperation of of the management and the employés.

THE QUESTION OF RAILWAY TAXATION.

THE recent decision of the New Jersey supreme court, whereby the Railroad Tax Bill of 1884 was declared unconstitutional, and the state not only deprived of its expected revenue but also rendered liable for the taxes illegally collected from its railways for two years past, will probably have a salutary effect upon the methods adopted of taxing corporations in the future. It had been the boast of New Jersey, freely and openly made, that the tax upon her railways yielded sufficient returns to meet all the expenses of state government, rendering a general state tax unnecessary, and its supreme court has very properly decided that any tax levied upon one special class of corporations exclusively was not in accord with the constitution of the state.

Just why the railways should be mulcted in this high-handed manner is somewhat difficult of comprehension. It is claimed, and the argument is a most specious one, that railways demand and receive greater privileges than any other class of corporations; that practically a railway is the only corporation for which private lands are condemned, and whose operation decreases the value of private property. Both of these statements are in the main correct, but there is a conspicuous omission of the equally true statement that for every dollar's worth of property whose value is decreased by the operation of a railway, there is a hundred dollars' worth of property whose value is enormously increased thereby. As to the condemnation of private lands for railway purposes it may safely be said that there is never any objection made by the property-owners to the condemnation *itself*, but to the amount of damages awarded; and in view of the immense public benefit conferred in the construction of railways it is but right and proper that the corporations should be protected from the extortionate demands of "smart" land-owners, who if unrestrained would refuse to sell their property save at thrice its real value. In fact, weighing the special privileges granted railways with the

special benefits which they confer upon the public, it will be found that they are entitled to the same favor shown other corporations—no more and no less.

New Jersey is a comparatively small state, and the salaries paid its state officers are moderate. Its legislature is numerically small compared with those of other states, and the legislators receive but nominal pay for their services. Naturally the expenses of state government are not excessive, being estimated at $1,000,000 yearly. It is further to be noted that in proportion to its area New Jersey possesses a greater railway mileage than any other state in the Union, and in fact than any country in the world, and it is quite possible that the tax imposed by the Tax Bill upon its railways would not fall heavily upon the corporations; but the eternal justice of things demands that corporations should be treated fairly and impartially, and that a special tax upon one corporate class alone is a manifest wrong. Therefore the decision of the supreme court of the state is a righteous one, and will, we trust, be far-reaching in its moral effects.

EDITORIAL NOTES.

THE admirable series of articles by Dr. S. S. HERRICK, on "Railway Medical Service," which concludes with this issue of the JOURNAL, has attracted much attention from our readers. The subject has been most exhaustively treated and attention has thereby been directed to the question by more than one prominent railway in the country. Dr. HERRICK is probably the only man who has carefully and systematically studied the subject and collected the information in concise form, and we are glad to say that while the series on the medical service of the United States ends with the present volume, the author has assured us that he will continue to furnish contributions to the JOURNAL on the same subject as fresh information is presented.

* * *

ENGLAND rejoices in the successful completion of a great engineering feat, and the tunnel under the Mersey river is now in operation. The opening of the Mersey tunnel was marked by a royal visitation and all manner of festivities, and, in fact, England has cause to be proud that this undertaking was accomplished before our own Hudson river tunnel had fairly entered on its submarine journey. For once, American enterprise has received a set-back, and we must admit that they do some things better across the water.

* * *

THE dreadful disaster of the Tay Bridge in Scotland, on December 28th, 1879, by which scores of lives were lost, is brought to mind by the approaching completion of the new bridge at the same fatal spot. So soon do horrible calamities pass from the public mind! At the time of the disaster it was thought that the bridge would never be rebuilt, but a few weeks hence will witness trains passing over the new structure with scarcely more than a transient curiosity on the part of its passengers when the scene of the disaster is passed.

* * *

STRIKES and rumors of strikes. Throughout the west and southwest there are signs and portents of trouble ahead for the railways, and the recent strike on the GOULD system seems to be but the forerunner of other difficulties between railways and their employés. To add to the complexity of the outlook, it is stated that there will be a general strike in every branch of labor on the first of May, the end in view being the adoption of the eight-hour standard. Truly none can tell what a day may bring forth.

CASSELL'S *Magazine of Art*, for April, contains a number of attractive contributions, illustrated with the usual abundance of artistic engravings which characterize the publication. Prominent among them are "Slyfield, Surrey," by Basil Champneys; "A Chapter on Fire-Places," by J Hungerford Pollen; "American Embroideries," by S. R. Koehler, and "Art in Phœnicia," by William Holmden. *The Quiver* and the *Family Magazine*, published by the same house, are also received. "The Autobiography of Benjamin Franklin," "The Man of Feeling," by Henry Mackenzie; "The Rivals" and "The School for Scandal," the two plays being in one volume, "Sermons on the Card," by Bishop Latimer, and "Plutarch's Lives of Alexander the Great and Julius Cæsar," are among the latest issues of Cassell's *National Library*.

The Century's war series is continued in the March number by three interesting papers "Controversies in Regard to Shiloh," by Col. S. H. Lockett and Lieut.-Col. Alexander R. Chisolm; "The Fourth Regular Infantry at Gaines' Mill," by Major William H. Powell, and "A Correction of 'Our March Against Pope,'" by Gen. Longstreet. Gen. Buell also contributes an illustrated paper on "Shiloh Reviewed." Mrs. Van Rensselaer continues her series on "Recent Architecture in America," in a second illustrated article on "City Dwellings," and ex-Minister Benjamin his Persian sketches in "Mountaineering in Persia."

Volume VII of *Outing* concludes with the March number. The steady progress of the publication still continues, and the latest number contains much that it is interesting and artistic. Among the contributed articles of the number is the first instalment of Theodore Roosevelt's series on "Ranch-Life and Game-Shooting in the West," "Moose-Hunting," by Lieut. Frederick Schwatka and T. E. Lambert, and "After Geronimo," by Lieut. John Bigelow, Jr., U. S. A., all being handsomely illustrated.

THE Cincinnati *Graphic* is steadily improving and now contrasts favorably with the illustrated weekly newspapers of the eastern cities. The latest issue received contains a spirited portrait of ex-Senator Thurman.

Street-Railways.

American Street-Railway Association.

President.—Julius S. Walsh, President Citizens' Railway Company, St. Louis, Mo.

First Vice-President.—William White, President Dry Dock, East Broadway and Battery Railroad Company, New York City.

Second Vice-President.—C. B. Holmes, President Chicago City Railway Company, Chicago, Ill.

Third Vice-President.—Samuel Little, Treasurer Highland Street-Railway Company, Boston, Mass.

Secretary and Treasurer.—William J. Richardson, Secretary Atlantic Avenue Railroad Company, Brooklyn, N. Y.

Office of the Association, cor. Atlantic and Third Avenues, Brooklyn, N.Y.

The Fifth Annual Convention of the Association will meet in Cincinnati, O., on Wednesday, October 20th, 1886.

THE RECENT STRIKE.

THE past month has witnessed a most disgraceful strike by street-railway employés in New York and Brooklyn, and, despite the temporary success which the strikers seem to have achieved, their cause has lost largely with the public, who, as a rule, are unduly prone to side with labor against capital. Owing to the force of circumstances the street-railway companies have yielded to the extent of submitting to arbitration upon the issues presented, but they have undoubtedly by this time appreciated the fact that a further concession to the insolent demands of their employés will be simple ruin.

We say "insolent demands" and we say it advisedly. No one can question the right of employés striking for higher wages and shorter hours, but such was not the immediate motive of the strike in question. Nearly all of the street-railways had consented to the not unreasonable demands made upon these points, and in many instances these concessions were made without waiting for a formal request. But it is painfully true that organized labor is arrogant, ungrateful and arbitrary. The very fact that the street-railways yielded without a struggle to the demands made for shorter hours and better pay, was a triumph of "honest labor" over "grasping capital," and at once a further demand was made that certain obnoxious officials should be discharged. Had even this impudent demand met with compliance, it is highly likely that other still more outrageous demands would have been made, and unquestionably it would have been better in the beginning if the companies had shown some opposition to the original demands, even though they might have intended to grant them in the end. With rare inconsistency the striking classes are always grateful for what they fight for, but never for what is peaceably given them.

And the pity of it is that the daily press, with but few exceptions—of which the *Evening Post* and *Times* are honorable examples—truckled to the lawless rioters and condemned the police for their decidedly mild interference. It is by no means the only occasion where newspapers misrepresent public opinion, and we are rather inclined to think labor has made a bad move. The outraged public has been aroused, and it will take little more to drive them entirely from the support of the demands of the laboring class, when made by an organized body under the leadership of ignorant, clapper-tongued blatherskites. The individual worker will still obtain the sympathy he deserves, but when led by the nose and by some cheap demagogue whose sole aim is an inglorious notoriety, and incited by him and others of his ilk to acts of violence and riot, he and his fellows become enemies to the public welfare.

The street-railway companies have gone as far as they dare in yielding to the demands of their employés, and the latter had better reflect before they renew their arrogant pretensions. Organized labor has reached the summit of its greatness, and the height on which it stands is perilous. Let it beware of further indiscretion.

THE revelations made before the Railroad Committee of the New York senate in relation to the granting of the franchise of the Broadway surface road are the most astounding that have ever been brought to public notice. There has been more perjury to the square inch before this committee than in any legislative inquiry of the past ten years; but with all the lying and evasion, evidence most complete has been obtained that the franchise was secured through the most barefaced bribery of the honorable Board of Rumsellers who control the welfare of the Empire City. The investigation committee has been most terribly in earnest, and the repeal of the franchise by act of the legislature is practically assured. And in the face of it all the New York aldermen but a few days since calmly granted a score of new street-railway franchises, virtually without recompense to the city. Most earnestly is it to be wished that the city itself could be deprived of its charter, and governed in some other way than by the scourings of gin mills and by disreputable political strikers.

UNIFORMING CONDUCTORS AND DRIVERS.

BY F. MARTIN GAYLER.

[Written for the AMERICAN RAILROAD JOURNAL.]

THE custom of putting the conductors and drivers of street-cars in appropriate uniforms is not common in this country. It is the exception, not the rule, and the occasion is rare when these employés are furnished with any distinctive mark of office other than a small badge, which is often concealed under an overcoat or otherwise invisible.

It is difficult to find any reason for uniforming conduc-

tors and brakemen upon railways that will not apply with even greater force to the conductors and drivers upon street-railways. The intercourse of the street-car conductor with his passengers is certainly more constant and frequent than in the case of the conductor upon the ordinary railway, and the driver too, comes in for his share of intercourse with the traveling public. Certainly there should be provision made whereby the conductor and driver should be instantly recognized, and especially the former. As possession of reins and brake may be considered a sufficient indication of the occupation of the driver, the reasons for putting him in a uniform are not as urgent as in the case of a conductor, but it should be advocated on the ground of symmetry and neatness.

Every street-car passenger has at times experienced difficulty in recognizing the conductor, especially on occasions when the rear platform was crowded with passengers; and on those roads not using the bell-punch or other form of fare-register—they are not many, it is true—there is an uncertainty in the payment of fare as to whether it has gone to the right personage. The average conductor dresses himself in pretty much any manner he pleases, and there is even a great diversity in the style of hats worn. He is hidden behind a pleasing impersonality which more than once is a cloak for some open violation of the rules.

Common-sense calls for the conductors of street-cars to be uniformed in some manner, and also the drivers, though the importance is not so great in their case. The expense of such uniforming need not be great, nor need it extend to the entire clothing. As a rule a coat alone, if sufficiently distinctive, will answer the purpose, or even a uniformed cap provided it be conspicuous in shape and style, and be plainly marked with the word "Conductor." The public has a right to know the company's servants at sight, without the necessity of indulging in guess-work and running the risk of offending some over-nice masculine passenger who would show marked disapproval at being taken for the official in question.

Another point to be considered is the increased discipline which would be inculcated. For some reason not easily explained a uniform does wonders in establishing an *esprit de corps* among employés, and if it be a handsome one there is a proportionate amount of pride displayed in keeping it neat, In sober truth it cannot be said that the average conductor is very neatly attired, nor is there any very great inducement to such neatness so long as he may exercise free choice in his attire; but the possession of a handsome uniform acts as a very great inducement to tidiness and general neatness of appearance. And certainly if it be a point with a road to keep the inanimate car in a state of neatness there are equally good reasons why the animate conductor should be correspondingly neat.

Altogether there seems to be every reason why conductors and drivers should be uniformed as attractively as possible, and we may hope that the subject will be among those selected for discussion by the American Street-Railway Association at its next session, and that some definite conclusion may there be reached as to the advisability of recommending the measure. The subject is at any rate entitled to careful consideration by street-railway managers.

DISEASES COMMON TO CAR-HORSES AND THEIR TREATMENT.

[Report of the Special Committee read at the recent Convention of the American Street-Railway Association.]

(*Concluded.*)

THE next group of diseases which we will consider is known by the term colic. The knowledge of colic in its various forms is of great importance to owners of horses and managers of large stables. The frequency off its occurrence, the intense severity of the attacks, the pecuniary loss so often involved, the difficulty of prevention by prophylactic means, together with the fact that it is to colics, principally those of indigestion, with or without overloaded intestines, that the greatest amount of mortality among car-horses is due—therefore warrants a careful study and consideration.

The term colic in its etymological sense relates to that portion of the intestines known as the colon, but in the present nomenclature of diseases it is applied to all the acute varieties of pain independent of inflammation and structural lesions that affect the digestive organs contained in the abdomen.

This method of denominating several varieties of disease under a single name from the fact that they have some symptomatic feature in common, causes confusion in the study of the diseases and presents difficulties in describing the symptoms and the diagnosis. We will, therefore, consider the several varieties of colic under particular names which either denote the causes or the locations of the pain. The forms that we will consider and that are most frequently met with in our car-stables are the *spasmodic* or *nervous*, the *tympanitic* or *wind*, and the colic due to impaction of the food or fæces in some portion of the intestine.

We will first consider the general symptomatology of colics, and then study the particular forms with their differential diagnoses. The commencement of an attack of colic is usually sudden; at times the attack begins by the patient manifesting a degree of languor and dullness; if in the stable, he stands back at the end of the rope of his halter and looks around at his flanks; if on the street and in harness, he will not show his usual spirit in driving, will not respond to the bit or whip, will knuckle over on the hind fetlocks and possibly stumble. But, whether the attack appears suddenly or slowly, the horse soon becomes restless, and paws and stamps on the ground; if in the stall pulls his bedding back, flexes his fore-legs, hesitates to lie down, although making the attempt, and finally lies down, either to roll once or twice and then get up, or remains down extending all four legs against the stall resting flatly on the sides, or possibly lying entirely upon his back. These positions are not continued long; he soon rises up, moves about, paws and perhaps lies down again and rolls, at times expressing his suffering with moaning and grunting. The countenance is always anxious and contracted, the eyes are dilated and at times fixed, the nostrils are widely opened, and the whole face expresses pain and suffering. In some cases the paroxysms are intermittent and there is a time of rest to the animal when he remains quiet, although presenting an anxious and expectant look, when in a short time another paroxysm of pain takes place. While in others the pains are con-

tinuous, the animal is in constant and wearisome motion, getting up and down, pawing, stamping and looking at his flanks. The movements and struggles are more or less violent, according to the severity of the pains. Every horse, however, has his own peculiar form of attack, and his special mode of exhibiting his distress, and the general manifestation will be modified according to the individuality of the patient.

The temperature in all colics at the onset is normal, but may rise a degree from the labor and excitement as the pain continues; the respiration is accelerated, and remains so to the end of the attack, whether fatal or favorable.

The pulse is, as a rule, hard, small and often irregular, and the arterial tension below the normal, while the heart's action becomes decreased; when the disease has progressed somewhat the heart becomes accelerated, but the pulse remains hard, small and thready; this is especially noticed in those cases that terminate fatally. In the first stages there is often a profuse perspiration, and in those cases that are approaching dissolution there will be a profuse sweating and a cold icy feeling over the entire body.

Certain cases of colic, either by treatment or a natural reaction, recover; the point at which a cessation of the pains takes place is shown by a free expulsion of gases or fæces, or a copious evacuation from the bladder. The intense expression of the face passes away and the animal frequently shakes himself and begins to munch hay, while in other cases, even with the best care and treatment, the struggles become more violent and rapid, the symptoms of pain become more aggravated and decided, the animal seems to become unconscious and regardless of the attendants and objects about him, the respiration becomes more accelerated, the pulse, at first hard and thready, becomes less distinct, and finally almost imperceptible; the mucous membrane becomes injected and a cold perspiration covers the whole body. At the approach to a fatal termination a deceptive appearance presents itself; the animal becomes quiet, stands with head out-stretched and seems to be in relief; but there is still the characteristic expression in the face of extreme pain, the respiration although not so labored is quickened, the pulse is almost imperceptible and possibly pulseless; the animal lies down carefully, stretches his legs, and with a few struggles and convulsive efforts expires; or at times they persistently stand, the muscles of the shoulders and hips will be seen to quiver, the animal will reel and suddenly fall forward, and with a struggle is dead.

During even slight attacks of colics the functions of the gastro-intestinal canal and of the bladder are suspended, there is a paralysis of the muscular coats of these organs, and as a differential diagnostic point it is well to remember that in all intestinal and stomachic colics the functions of the bladder are checked, and that although the animal may present the desire to micturate, still, the trouble is not in the bladder but in the stomach or intestines.

The differential diagnosis of colics is, as a rule, exceedingly difficult. Still, although there are many attitudes and actions common to the numerous forms which manifest themselves by colicky pain, there will always be present some special characteristic symptoms which will aid us in making a correct diagnosis, and it is very essential to make a correct decision at the outset and then proceed with the proper treatment.

The first form of colic, the symptoms and treatment of which we will consider, is the nervous or spasmodic, and this form generally manifests itself some time after eating or drinking, and often after a long drive. The morbid condition is considered to be spasm, and its seat is therefore the muscular coat of the stomach or intestines. The spasm may be preceded by paralysis of a portion of the intestines, and may be produced by causes which act directly or indirectly through the nervous structure.

The pains produced are intermittent and vary in intensity, and continue from two to six hours. The abdomen is retracted, respiration accelerated, pulse is quickened, but presenting fullness under pressure, and continues so unless approaching a fatal termination, when it becomes small, hard and thready. When exercised, motion is not painful and in some cases seems to afford relief. The pains and paroxysms in spasmodic colic are very severe, and the animal during the spasms will throw himself down with great violence and quickly jump up and at once commence pawing or moving about in the stall. Then there will be a cessation of the pain and the animal seem relieved; but in from five to ten minutes there will be a return of the spasm and the animal will again undergo violent exertions. The temperature is always normal or but slightly increased if the animal has been suffering for a length of time. The abdominal muscles are frequently retracted. Care should be taken to discriminate between spasmodic colic and peritonitis or inflammation of the bowels; in spasmodic colic the pains are not continuous and are more violent. There is but very slight increase in temperature, while in peritonitis the temperature is always increased. Spasmodic colics are generally attributable to the local irritation of the ingesta; it may arise from indigestion either from excess in quantity, or from the indigestible quality of the food. It frequently follows exposure to cold or fatiguing exercises, but these causes probably act by occasioning indigestion. Certain foods with particular horses will give rise to spasmodic colic in consequence of an idiosyncrasy which is inexplicable.

This form of colic, although attended with great and protracted suffering, is not considered fatal. It is one of those violent functional affections from which recovery takes place rapidly. It has no tendency to eventuate into inflammation or any other disease, but in proportion to its duration it is followed by fatigue and weakness, and more or less abdominal soreness may remain; and should the attacks be repeated in the same animal he will become weak and emaciated, and if they be not checked or relieved he will die from exhaustion during an attack.

The treament in spasmodic colic has two objects: first, to check the spasm, and, second, to relieve the pain, and thus prevent undue exhaustion. Chloral hydrate has been found the most efficacious medicine and presents the best results; it should be given in the form of a ball composed of chloral hydrate, one ounce, pulverized lobelia, one drachm, and sufficient honey or simple syrup added to form a mass. This in most cases will be found to relieve, but should the pains continue for an hour or more another ball composed of half the quantity given above, or a drench, which the writer has found to act with excellent results in those that are persistent, composed of

chloral hydrate, one-half ounce, and opei tincture, one ounce, in about a pint of water. In most cases the administration of the ball alone will, in about fifteen minutes, relieve the pains and produce quiet and peaceful sleep.

THE TYMPANITIC

form of colic is not difficult to diagnose and is recognized by the swelling and tympanitic condition of the abdomen. It first presents the usual symptoms of all colics, namely, uneasiness, pawing, a desire to lie down, when if the ear is placed to the right flank the formation and passage of gas from one portion of the bowels to another may be heard, and soon there will be noticed a distension of the abdomen, and with the continued formation of gas the flanks and abdomen become hard, resisting, and more or less resounding on percussion. The animal exhibits great pain and assumes many positions, at times throwing himself down with great violence, and it is during these efforts that complications arise which prove fatal. Such as the rupture of some portion of the intestines or stomach, laceration of the diaphragm or distension, and rupture of some of the larger blood-vessels, producing internal hemorrhage.

This form of colic is due to indigestion with fermentation. The stomach and bowels are torpid, the food undergoes fermentation and gives rise to the accumulated gases. Again, other causes are foods that are of poor quality or have become heated or fermented. Water taken into the stomach while the animal is warm or exhausted after violent exertion, or over-loading the stomach in cases where the animal gains access to the feed-box, frequently give rise to this form of colic. It is common in cribbers and is an evidence of the bad condition of their digestive apparatus. Frequently the formation of gas takes place in the stomach and the distention of the bowels is not so apparent. This condition may be recognized by the regurgitation of the gases in the throat.

In the treatment of this form of colic prompt action is very essential. If the distention is great, relief should at once be given by recourse to the trocar and canula; this is an instrument composed of a silver tube or canula about eight inches long and one-quarter of an inch in diameter, into which is inserted a round steel rod or trocar, one end of which is pointed and the other end inserted into a handle, the pointed end projecting beyond the canula about half-an-inch. This instrument then is inserted through the skin and into the large intestine called the colon; the point for inserting is on the right flank and is at the point of an angle formed by drawing two diagonal lines downwards, one from the external point of the hip and one from the last rib, and the point at which they meet will be the point at which a puncture can be made. When the trocar and canula have been inserted almost to the full length the trocar is withdrawn and the canula allowed to remain, when the gas contained will escape and with such force as to produce a distinct whistling sound.

To relieve the gas that has formed in the stomach and the small intestines, four or five balls composed of six drachms each of pulverized wood-charcoal rolled up dry in tissue-paper will act to absorb it. Also give to the animal a drench composed of:

Opei Tr.	2 ounces,
Belladonna Tr.	2 drachms,
Ammonia Spr. Aromat.	1 ounce,
Soda Bi. Carb	4 ounces,

to which add about a pint of water; and should the horse not gain entire relief in one or two hours, the above drench may be repeated. Should the distention continue and the animal seem greatly distressed and respiration quickened, he should then be again punctured with the trocar and canula. There should be no hesitancy in puncturing. There is but one unpleasant result that may follow, which is the formation of a smell abcess at the point where the puncture was made, and that should be opened at once with a sharp scalpel and bathed with hot water several times a day. But this seldom follows, especially if care is taken to withdraw the canula quickly when the flow of gas ceases.

The other form of colic which we will consider is that due to impaction of the ingesta at some portion of the intestine; this impaction may occur at any portion, either in the large or small intestines, or even the stomach.

The symptoms are not difficult to distinguish and the history of the case will be an important factor in the diagnosis.

The animal is dull, refuses food and sometimes water, paws the bedding and occasionally lies down, remaining for a time and then rising to commence pawing again. The respiration in the first stages is not accelerated, but if the animal continues to suffer two or three days it becomes quickened. The pulse is quickened and full at the commencement, but if the impaction continues it becomes hard and thready. The history of the case will reveal the fact that the animal has not defecated freely, and has been dull and dejected. The symptoms are not violent as in spasmodic colic nor is there any tympanitis as in wind colic.

The etiology of this form of colic is in most cases obscure. In some cases it is due to over-feeding and not sufficient work. Horses that are convalescing are permitted to eat large quantities of hay, and perhaps their bedding is affected with it.

Animals that are debilitated either from age, overwork or sickness, lack force and tonicity in the peristaltic action, and the result is impaction of the food at some weak point of the bowels, and to this impacted ingesta is added all the food that the animal may take before showing distress. The treatment should always be heroic. Purgatives should be given at first in the form of raw linseed oil, one and one-half pint, and give injections of warm water and soap containing two ounces of the tincture of barbadoes aloes every three hours. Should the bowels not show any response in from ten to twelve hours, a physic ball should be given composed of aloes barb. pulv., one ounce, nux. vomicæ pulv., one drachm. And a nerve tonic in the form of tincture of nux. vomicæ, one ounce, tincture belladonna-leaf, two ounces, water sufficient quantity to make eight ounces, and give an ounce every three hours. If the animal is weak and seems exhausted, a drench of one ounce of alcohol and eight ounces of water should be given every four hours. The principal object should be to endeavor to induce an action of the bowels, and when the diagnosis of impaction is made all efforts should tend to promote the action of the bowels.

The prognosis is always doubtful and most cases of impaction are very persistent and frequently never respond to treatment.. The animal will continue to suffer from four to eight days and then die.

There are other conditions which give rise to colicky symptoms, but from the fact that they are not of frequent occurrence in our railroad stables, and the time necessary to describe them being beyond our limit, we will simply mention them and advise that, in cases of colic which present symptoms of an unusual and remote character, a competent veterinary surgeon be employed to treat them.

INVAGINATION,

or the condition where one portion of an intestine is pushed into a portion adjacent, is either due to a lack of peristaltic action in one portion or to the calibre of a portion of the intestines becoming enlarged, and the part next to it being received into it. This condition when it does occur presents persistent colicky pains and frequently terminates fatally.

Foreign bodies taken into the stomach by the mouth, producing irritation or the formation of calculi, give rise to colicky pains that are often obscure and difficult to diagnose.

The various forms of hernia, either scrotal, inguinal or rectal, will produce colicky symptoms requiring the prompt attention of a competent veterinary surgeon.

CEREBRO-SPINAL MENINGITIS.

The name cerebro-spinal meningitis denotes an inflammatory affection of the vascular membrane or pia mater, which surrounds the brain and spinal cord; but the disease among car-horses and other classes of horses is infectious and affects a number of horses over a large area, and should most properly be termed "epizootic" cerebro-spinal meningitis.

This diseased condition, which should be considered as an essential fever, presents various symptoms and is often confounded with the sporadic cases of traumatic-spinal meningitis, with azoturia cerebral hemorrhage, with motor paralysis, (which diseases we will be unable to consider in this article) and with other conditions which produce paralysis, from the fact that they have the symptoms of motor paralysis in common; and it is from this fact also that so many errors have been made in regard to this disease and its treatment.

In the majority of cases of cerebro-spinal meningitis an exudation of a gelatiniform character is found in the meshes of the pia mater of the brain and cord, and the extent of the exudation varies in different cases. It may be found in scattered patches over the whole of the membrane, or more frequently it is found at the base of the brain and in the sacro-lumbar region of the cord. The substance of the brain and cord is usually hyperæmic, and is the seat of small hemorrhogic extravasations.

In those cases which terminate in a few hours the anatomical evidences of the disease may be very slight or entirely absent.

The characteristic features of this disease are very destructive. In many cases it commences with a sudden attack, the animal being at once stricken down with grave symptoms, complete loss of motor power, at times preceded by staggering and knuckling over of the fetlocks. If in the stall, the animal is noticed to stagger and stumble forward when endeavoring to move from one side to the other; or if on the road and in harness, the animal will be noticed to make missteps and be unable to control the movements of the hind feet, when soon the animal will fall and be unable to get up. When down the animal usually struggles very violently, although in some cases coma takes places early and then the animal remains almost motionless.

The pulse and respiration are usually quickened. The temperature at the outset of the disease is usually normal and frequently below normal, but after the disease has continued the temperature becomes elevated, although in many cases the pyrexial symptoms are variable, and there is considerable difference of opinion among authors as to the temperature in this disease; but, in the writer's practice, it has been found that at the first attack it is normal or below, and after the first, second, or third day the temperature becomes increased according to the severity of the symptoms.

The pupils of the eyes are greatly contracted and if the optic nerve be examined by means of the opthalmoscope, it will be found to be highly congested. The animal is acutely sensitive to external noises and impressions, and seems to be conscious of great pain when moved or when pressure is exerted along the spine over the lumbar region. The urine is retained until by the pressure of the extended bladder it is forced out in small repeated quantities. The fæces are retained and the bowels are usually torpid.

The severity of the symptoms and the duration and progress of the disease are very variable. In some it may be sudden, the horse falling with complete paralysis; coma may set in during the first six hours and the ainmal die within twelve hours from the first signs of the attack, or the development of the symptoms may not be so acute; the animal may be somewhat dull and inactive, appetite may be wanting, and the first day or two may also present a slight stiffness, with some knuckling over upon motion; and upon the third or fourth day there will be a loss of control of the hind extremities, with finally paralysis of the muscles of both extremities and contractions of the facial and cervical muscles.

In those cases where the paralysis is almost complete at the first recovery is very doubtful. And in those where the symptoms are gradual, if there are no complications, convalescence may take place during the second or third week of the attack, and it is generally tedious and the animal remains weak for a considerable time. Remissions occur and they vary as regards their time of occurrence and duration. Pulmonary complications also occur during an attack which usually proves fatal.

The pathological character of epizootic cerebro-spinal meningitis is embraced in the statement that it is an infectious disease and belongs among the essential fevers. The inflammation of the pia mater of the brain and cord is a local manifestation, or an effect of a general morbid condition. Of the nature of this general condition we have no positive knowledge.

There are few epizootic diseases so destructive to horses as cerebro-spinal meningitis, and more especially during the first outbreak the death rate is very large. The prog-

nosis in all cases where the symptoms are severe is exceedingly grave.

In the treatment there can be no definite prescription laid down, from the fact that we are not familiar with the causes of the disease. Various potential therapeutical agents have been employed, but no reliable or curative treatment has as yet been discovered.

Experience has, however, shown the utility of certain measures, in the use of which one should be governed by the rational and symptomatic indications presented in each individual case. For those horses that have been attacked in full health, that are plethoric and presenting a strong and full pulse, blood-letting will be serviceable and a ball composed of pulverized barbadoes aloes, eight drachms, should be given. But if the animal be anæmic and with a pulse that is readily compressed, blood-letting would be contra-indicated. In very severe cases that express great pain, the tincture of opium in two ounce doses, repeated every four hours, has been found by some writers to afford great relief; but the use of chloral hydrate in half-ounce doses, together with bromide of potassæ, two drachms, given every four hours, has proven more effective to relieve the pain, and does not interfere with the dose of aloes which is given at the outset. The application of cold to the head and spine is always advisable, and one of the best methods is to apply bags containing finely broken ice to the head and along the spine.

During the first days the animal should not be put in slings unless able to stand; then it is well to sling him at once. But, if the paralysis is complete, it is better to allow the animal to remain down, turning him over from one side to the other every six hours. But after the first paroxysms are over and the animal shows an inclination to rise, it is then well to sling him, only allowing him to remain up for a short time, and then letting him down and increasing the time he remains in the slings according to his strength. The use of liniments, sinapisms and stimulating applications to any part of the body should be avoided; if the legs below the knees and hocks become cold, hand-rubbing and the application of a red flannel bandage should be used.

If the animal is weak and presents great prostration, then the administration of stimulants every hour in the form of alcohol, one-half ounce, and quinine sulphate, one drachm, will be found to give good results. Should the animal show improvement after the third or fourth day, use iodide of potassæ in one drachm doses every six hours in his drinking water, and the usual carbonate of ammonia ball with an increase of pulverized nux vomicæ given three times a day. The ball may be made up as follows:

Carbonate of Ammonia	2 ounces,
Camphoræ Pulverized	1 ounce,
Nux Vomicæ "	1½ ounces,
Gentianæ Rad. "	2 ounces,

and sufficient honey to make a mass and make eight balls.

As improvement continues the food should be increased and the amount of stimulant medicines decreased, and care should be taken not to put the horse to work too early.

The Electric Elevated Railway in St. Louis.

THE railway committee of the St. Louis City Council will report in favor of the elevated electric railway bill, and there is now a fair prospect of its becoming a law during the present year. The route of the road is from Grand avenue and Arsenal, eastward to Seventh street, Seventh to Howard, Howard to Broadway, Broadway to Salisbury, Salisbury to Palm, and Palm to the Fair Grounds. Only the provisions of the bill are now under consideration. An elevated electric railway is an accepted fact, as far as the committee is concerned at least.

A New Use for Street-Railways.

THE Metropolitan Street-Car Company, of Atlanta, Ga., is breaking a lot Texas ponies by making them pull street-cars. This is an excellent way to break bucking ponies, and it also affords infinite amusement to the passengers. A passenger gets aboard of the car, and is not in any particular hurry about arriving at his destination; a regular Mazeppian steed is hitched to the car, and all along the line there are stoppages and lots of fun. All this any citizen can get for the small amount of five cents.

Inspecting Cable Roads.

THE Boston board of aldermen, who are to report on a system of rapid transit for their city, have inspected the cable railways of Philadelphia and New York, and also the cable line on the Brooklyn Bridge.

STREET-RAILWAY NOTES.

THE construction of the electric motor cars to be furnished by the Van De Poel Company for use on the Minneapolis street-railways is being rapidly finished. These cars will be lighted by electricity, and furnished with electric brakes.

NEW BRUNSWICK, N. J., has never had a street-railway, but in a sudden attack of enterprise the aldermen of the city have recently granted franchises to several newly-organized street-railway companies.

THE Citizens' Street-Railway Company, of Elkhart, Ind., has received a franchise. The Knights of Labor secured a clause requiring hours and wages to be agreed upon by an arbitrator.

THE Mount Vernon, (N. Y.) New Rochelle and Yonkers Surface Railroad Company has been granted a franchise by the Mount Vernon board of trustees.

THE National Motor Company has been incorporated at Chicago, with a capital stock of $250,000, to manufacture street-railway motors.

THE Evanston (Ill.) Street-Railway Company has been incorporated to operate lines by horse and cable traction. Capital stock, $150,000.

IN the department of New Inventions of this month's JOURNAL will be found the description of an improved heater for street-cars.

AN application has been made for a charter for the Pittsburgh (Pa.) Elevated Railway Company, with a capital stock of $50,000.

SCHENECTADY, N. Y., is to have a new street-railway. The capital stock is to be $50,000 and the route five miles long.

A FRANCHISE has been granted for the construction of a street-railway in Newburg, N. Y.

New Inventions.

Vogel's Railway Telegraph.

WILLIAM VOGEL, of Chicago, Ill., is the inventor of an improved system of telegraphing or telephoning between railway-stations to moving cars, which is herewith illustrated and described. The object of the invention is to provide a means for sending telegraphic and telephonic

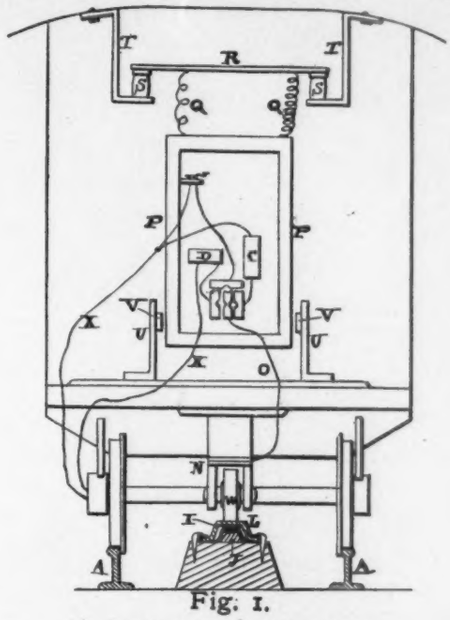


Fig. 1.

VOGEL'S RAILWAY TELEGRAPH.

messages to trains at a distance from the station, whether the trains are stationary or in full motion, and so to construct the receiving-chamber that the noise of the moving train will be deadened, so as not to interfere with the operator in sending and receiving messages.

In the accompanying cuts, Fig. 1 is a vertical cross-section taken through the car and the railway-track, showing the electrical connection between the station and the car; Fig. 2 a longitudinal section of the car, taken at

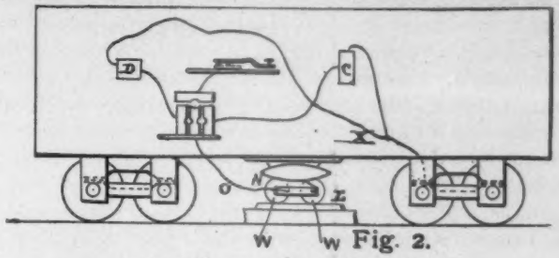


Fig. 2.

VOGEL'S RAILWAY TELEGRAPH.

right angles to Fig. 1; Fig. 3 a plan view of an apparatus embodying the invention; Fig. 4 a detailed view of the receiving-chamber, and Fig. 5 a vertical cross-section of the wire, its bed and covering.

A represents the rails of the main railway-track; B the battery placed at the station; C the telephone; D a telegraph apparatus; E the switch, and F G the ground lines. The battery is connected with the wire I, by the wire H, which wire I, extends along the track between the two main rails. Along the main track in between the two rails, is placed, upon any suitable base or support, the bearing J, of any suitable shape, size or construction, and upon the top of which is placed any insulating compound or material. Upon this support J, is placed the copper wire I, and over the top of the support J, and the wire is placed a cap-piece L, which is in contact with the wire, and which serves as a conductor between the wire and the wheels of the truck. This cap L, is spiked or otherwise secured in position in any suitable manner.

Secured to the under side of the receiving-car is the truck N, which is provided with one or more wheels which bear against the cap-piece L, in between the rails of the main track. This truck is here shown as provided with two wheels and a suitable spring, but any suitable construction will answer. The truck is insulated from the car, but is electrically connected to a telephonic or

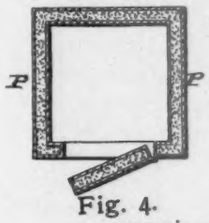


Fig. 4.

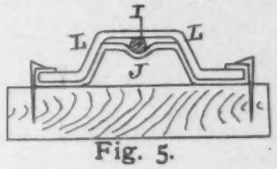


Fig. 5.

VOGEL'S RAILWAY TELEGRAPH.

telegraphic apparatus, the same as at the station, by means of the wires O.

In the receiving-car is placed the receiving-chamber P, which is of any suitable shape or size, and which is suspended by means of the spring Q, from the cross-bar R, which is supported in turn upon springs S, which are placed upon the brackets T, which project down from the roof of the car. The springs S, may be formed of rubber or any suitable material that may be preferred. The lower end of the chamber P, does not extend down to the floor of the car, but is raised a suitable distance above it, and is prevented from swaying back and forth by means of brackets U, which are provided with rubber springs V, upon their inner sides. The walls of the chamber are made double and packed with any suitable material for the purpose of deadening the sound and preventing the noise of the moving train from interfering with the operator in sending or receiving messages.

As before stated, the telephonic and telegraphic appara-

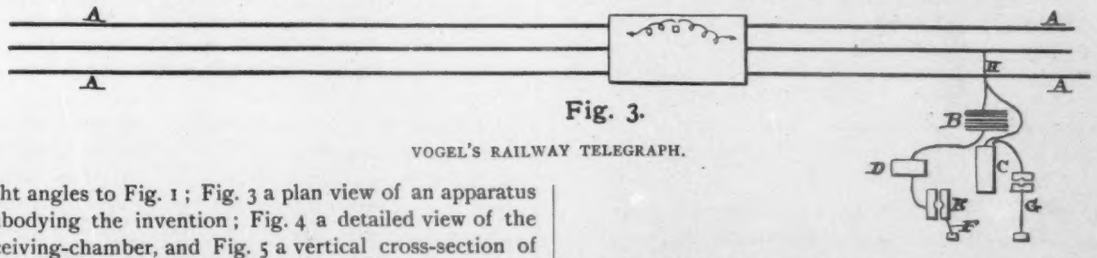


Fig. 3.

VOGEL'S RAILWAY TELEGRAPH.

tuses employed in the receiving-chamber are the same as used at the station. The current passes through the battery-wire I, and through the wire to the covering L, placed over it. Where the train is either in motion or at rest upon the track, the current passes through the covering L, the wheels W, of the truck, through the wire O, to the switch, and then either the telegraphic apparatus or the telephone, as may be desired. The return current passes through the wire X, to the car-wheels, and from thence into the ground. The telegraph operator, seated in the receiving-chamber P, can freely send and receive messages either upon the telephonic or telegraphic apparatus, as desired.

This system of railway telegraphy is claimed by the inventor to be simple and reliable. It is now entirely controlled by Adolph Zeller, of Chicago, Ill., to whom the patent-rights have been assigned.

McAllister's Car-Coupling.

SANDERS F. MCALLISTER, of San Marcos, Tex., is the inventor of an improved form of car-coupling, which is herewith illustrated and described. In this coupling the central opening of the draw-bar is formed with a tup-bar having rearwardly a spiral-spring. The forward end of this tup-bar is inclined forward somewhat at an angle at the top, so that when the bar is pushed forward by the spiral-spring at its rear end, the coupling-pin will rest upon this forwardly-projecting end of the bar, while the link will rest beneath, so that in dropping the pin will rest within the link, and not on the outer side, which would be the case if this bar were square. The coupling-pin is manipulated by a series of bars and levers as is customary with devices of this kind.

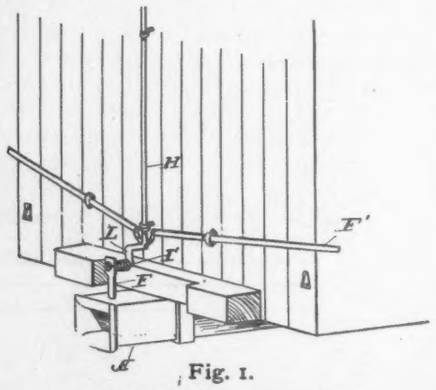


Fig. 1.

MC ALLISTER'S CAR-COUPLING.

In the accompanying cuts, Fig. 1 is a perspective view of an ordinary freight-car provided with the improved car-coupling, and Figs. 2 and 3 central sectional views of a pair of couplings.

A represents an ordinary draw-bar, wherein the usual opening B, centrally is somewhat elongated preferably within the draw-bar. Within this opening B, is provided a tup-bar or bolt C, of such a size as to operate freely backward and forward therein. Between this tup-bar C, and the rearwardly-vertical end of the opening B, is provided a spiral-spring D, which is designed to force the tup-bar C, forward past the opening E, having therein the usual coupling-pin F. The tup-bar C, is designed to project forward, by the action of the spriug D, far enough so that when the link G, is not in the draw-bar, as shown in Fig. 3, the pin F, may be raised by means of a system of levers F', connecting with a vertical bar H, having at its lower end a right-angled projecting part I, provided thereon with a spiral-spring I'. The upper end of the coupling-pin is designed to be secured to the forward end of the angled projection of the vertical bar, and held in place by the spiral-spring I', pressing against the nut at the end of the angled portion, so that no strain may be produced on the vertical bar when the draw-bar is drawn either back-

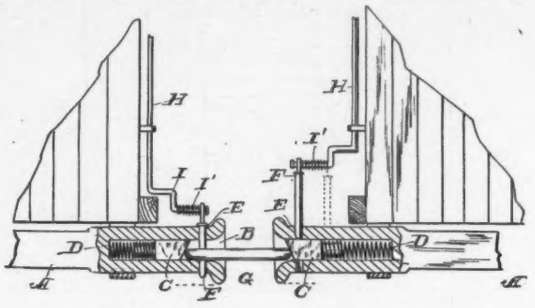


Fig. 2. Fig. 3.

MC ALLISTER'S CAR-COUPLING.

ward or forward. The forward end of the tup-bar C, is designed to be at such an angle that when the link is coupled, as shown in Fig. 2, the tup-bar C, is pushed rearwardly far enough to permit of the pin F, dropping down forward of the bar and securing the link in position.

The operation of the device is very simple, consisting in connecting one end of the link with a draw-bar, as shown in Fig. 2. The pin, in connection with the tup-bar C, holds the link G, horizontally. Then the pin F, of the opposite draw-bar is raised, permitting the tup-bar C, to move forward by the action of the spring D. which holds the pin in position above the draw-bar. The contact of the link G, in coupling, forces the tup-bar C, as shown in Fig. 3, rearwardly a sufficient distance to allow of the pin F, dropping down within the link G.

This form of coupling is claimed by the inventor to be simple, durable and efficient, and it can be attached to any car at small expense.

Hunter's Street-Car Heater.

FREEMAN S. HUNTER, of Fort Ritner, Ind., is the inventor of an improved heating device for street-cars, which is herewith illustrated and described. The invention consists in a car-heater constructed with heating-drums supported in a case held to the car-floor below an opening therein, and with a slatted guard held above the heating-drums to protect them from water or dirt which may fall through a grating fitted to the car-floor above the guard and drums, which latter have draft-openings at one end and connect at the other end with smoke-flues passing through the floor and roof of the car.

In the accompanying cuts, Fig. 1 is a sectional plan view of an ordinary street-railway car with the improved heater applied, and with the grating and guards of the heater removed; Fig. 2 an enlarged cross-sectional ele-

vation of the lower part of the car and the heater with the grating and guards of the heater in place; Fig. 3 a perspective view of one of the heating-drums, and Fig. 4 a plan view of a portion of the grating-cover of the heater.

A is the body of an ordinary street-car, which has the usual end platforms *a a*, sliding doors B B, and longitudinally-ranging side-seats C C. Along the center of the floor *b*, of the car, an opening D, is made which, as shown, extends for quite the whole length of the car-body; and below the opening D, is fixed the lower case E, of the heater, which is made with double side-walls *e e*, stayed by suitable bolts *e'*, and converging to a central point or line as at e^2, this case also having close and double-walled ends fitted closely to the car-floor at the ends of the opening D, so that admission of air through or around the case E, to the interior of the car is prevented to avoid drafts, and any suitable non-conductor of heat may be packed between the walls *e e*, of the case E, to prevent radiation of heat from the drums F, through the case to

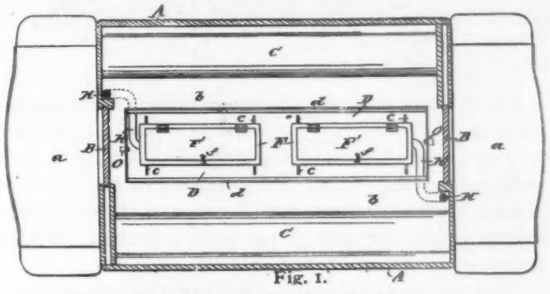


Fig. 1.

HUNTER'S STREET-CAR HEATER.

the outer air. The heating-drums F, are supported in the case and above its bottom by the cross-stays or brackets *c*, fixed to the case, The cuts represent two heating-drums F F, supported in the case E, as it is preferable to use two small drums, which may more easily be handled than a single long drum, and the two drums provide for better regulation of the heat with changing temperatures, as a fire may be made in either drum or in both drums, as may be required. In "bobtail" and other short cars, a single drum will be found sufficient.

As seen best in Figs. 2 and 3, the drums F, consist of elongated cases made, preferably, in cylindrical general form, and having a part or section F', hinged to the main body of the drum to form a cover, which may be opened to place the fuel *g*, into the drum and upon a loose grate G, supported near the bottom of the drum on cleats or flanges fixed to the drum, and any suitable hook and pin or other fastening, as at *f*, may be used to hold the cover F, closed. Draft-openings *f'*, are provided at one end of the heating-drum with an apertured draft-regulating slide f^2, over them, and a pipe or flue H, leads from its other end, and is preferably turned to one side, so that it may pass upward through the car at a point alongside of the car-door, as in Fig. 1, and extend to and above the car-roof, to carry off the gaseous products of combustion from the fuel in the drum; and comparatively smokeless fuel—such as charcoal or coke—is used to avoid excessive discharge of smoke or gases into the car or public highway. A wire screen is placed around the pipe H, to prevent burning of the hands in passing in and out of the car. Rabbets *d d*, are found at the opposite side edges of the floor-opening D, in which the grating-cover I, of the heater-case E, may be supported with its upper surface flush with the car-floor. The grating I, may be made in one or more sections, as desired, and the grating is hinged at *i*, to the floor, so that it may readily be swung back for access to the heating-drums F, when required for renewing the fuel or making adjustments or repairs.

To the under side of the grating I, is attached, by means of suitable side-braces or arms K K, and it may be the center-braces *k*, also, the shield or guard L, which consists of a series of plates or slats *l*, connected to ribs or frame-bars *m*, and at suitable distances apart vertically to

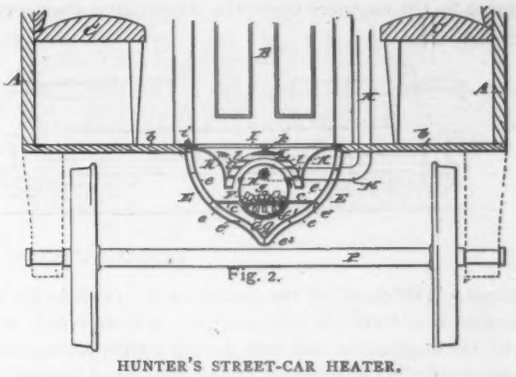


Fig. 2.

HUNTER'S STREET-CAR HEATER.

allow free rise of the heat from the drums through the slat-guard and grating to the interior of the car; and the slats *l*, of the guard L, are arranged edgewise relative to each other, so that any water passing through the grating I, onto the upper slats *l*, will be caught by the lower slats and conducted to the casing E, at the sides of the heating-drums, whereby the drums will be protected from the water or dirt dropping from the feet, clothing, or umbrellas of the passengers, and disagreeable odors from the heating apparatus are prevented. The drip-water may be emptied from the casing E, at any time by drawing the plugs O, from their holes in the ends or bottom of the casing, or

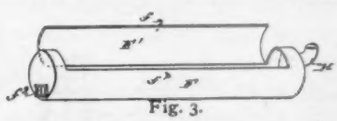


Fig. 3.

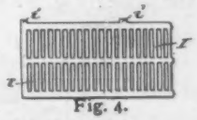


Fig. 4.

HUNTER'S STREET-CAR HEATER.

by opening any suitable valves similarly located. By connecting the guard L, with the grating I, the guard will be swung upward on the hinges *i*, with the grating. As shown in Fig. 2, there is ample room between the car-floor *b*, and its axles P, to receive the casing E, which, with the heating-drums, is entirely below the floor of the car, so that no room is taken up in the car by the heating apparatus except for the smoke-flues H, which require very little space.

It will be seen that this improved heater may easily be applied to old cars by simply cutting a hole through the floor at D, and attaching the casing E, having drums F, and the grating and guard I L, and fitting the pipes H, to the drums through the car-roof and floor; and with this heater it is claimed that a car may be warmed quickly, comfortably and economically.

De Mier's Electric Alarm-Signal for Railway-Cars.

JOHN R. DE MIER, of Las Cruces, N. M., is the inventor of an improved electric alarm-signal for railway-cars, which is herewith illustrated and described. The invention comprises an electric battery with two conducting-wires running through the cars of a train to the locomotive, these wires being charged by the battery and forming an open circuit; alarm-bells or gongs on the locomotive and on each car; suitable circuit-closers to be operated by the conductor; circuit-closers operated by the disconnecting of cars and circuit-closers operated by the the car-trucks, and all of these circuit-closers operating the gongs and giving notice to the engineer upon the locomotive whenever required. The object of the invention is to enable the conductor of a train to communicate instantly and surely with the engineer at any time during a trip; and automatically to notify the engineer and conductor of any accident that may happen to any of the cars during the trip—as, for instance, the uncoupling of a car or the derailment of a truck.

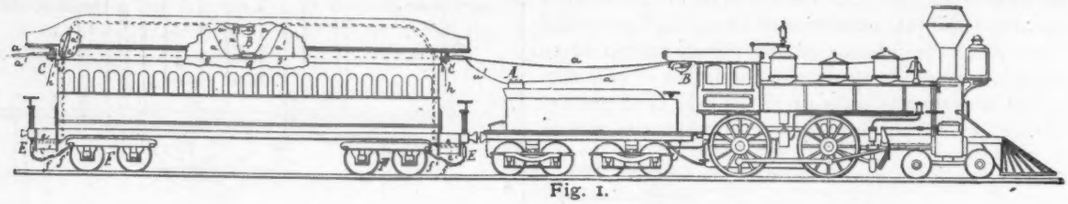


Fig. 1.

DE MIER'S ELECTRIC ALARM-SIGNAL FOR RAILWAY-CARS.

In the accompanying cuts, Fig. 1 is an elevation of a train, consisting of a locomotive, tender and a car, provided with the invention, certain portions of the car being broken away in order to show the invention more clearly; Fig. 2 a top view of one of the car binding-posts and circuit-closers; Fig. 3 an elevation of the same; Fig. 4 a bottom view of the removable part of the same; Fig. 5 a vertical longitudinal central section of the circuit-closer of the train-conductor; Fig. 6 a central horizontal section of the same; Fig. 7 a central vertical section of a truck circuit-closer; Fig. 8 an elevation of one of the electric gongs; Fig. 9 a diagram of an electric conductor used between the cars, and Fig. 10 a diagram of the alarm mechanism used by the train-conductor.

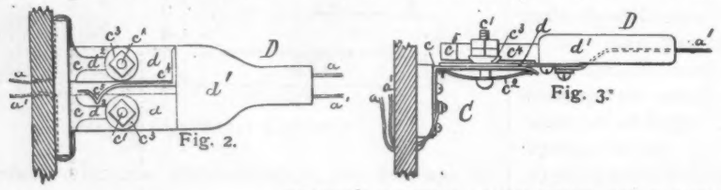


Fig. 2.

Fig. 3.

Fig. 4.

DE MIER'S ELECTRIC ALARM-SIGNAL FOR RAILWAY-CARS.

A represents an ordinary electric battery securely fastened to the tender or the locomotive. From this battery the positive conducting-wire *a*, runs to the engineer's gong B, of the locomotive, from there to the next car, through the gong B, of this car, and so on. The negative wire *a*, of the battery runs from it through the several cars of the train. The electric gong B, is of ordinary construction and consists of a gong-bell *b*, horse-shoe magnet *b'*, armature-arm b^2, carrying a bell-hammer b^3, and two binding-posts b^4, connected by a wire b^5, with the coils of the horse-shoe magnet. At each end of the car suitable binding-posts C, are provided, which consists of two angular conducting-plates *c*, suitably insulated, which plates are provided with bolts *c'*, spring-washers c^2, and unyielding washers c^3, with conical rims. Between the washers c^3, and plates *c*, the connecting-plates *d*, of the wire connections D, are inserted and securely screwed down with the bolts *c'*, as seen in Fig. 3. These connections D, consist of a non-conducting handle d^2, through which the wires *a a'*, pass lengthwise, and the two connecting-plates *d*, to which the wires are secured in a suitable manner. The ends of the connecting-plates *d*, are forked by means of longitudinal slots d^2, into which slots the bolts *c'*, of the angular plates *c*, enter when the connection with the wires *a a'*, and the car is made, and whereby any lateral displacement of the connection is prevented. One of the plates *c*, is provided with an elastic tongue c^4, having a curved or V-shaped end c^5, and this V-shaped end, in its normal position, is held behind and in range of the conducting-washer c^3, of the contiguous plate *c*, without touching either the plate or the washer.

If by accident or purposely the car is detached from its train, the connections D, and binding-posts C, become detached; but before being quite separated the V-shaped ends c^5, touch the washers c^3, of the contiguous binding-posts and establish a momentary closed circuit, whereby the magnets of the gong of every car between the closed connection and the battery, including the magnet of the locomotive-gong, become momentarily charged and attract their armatures to which the bell-hammers are attached and cause them to strike one blow, thus giving the alarm to the engineer and to the conductor, if the latter is in a car connected with the train. When the V-shaped ends c^5, leave their respective washers c^3, the electric circuit is again broken, so the conductor's circuit-closers G, can be operated ahead of the detached car. In establishing the electric connection of a car coupled to a train, the wires *a a'*, are provided with one connection D, at each end, and one of the connections is inserted into the binding-post C, of the forward car by pushing the forked plates *d*, between the washers c^3, and plates *c*, and then drawing tight the bolts *c'*. The same operation is repeated with the rearward car, and the two cars are then electrically connected. In practice these electric connections or couplings D, will be kept in a suitable store-room

ready for use, and are only attached to cars when a train is formed, and a surplus number of them, wherewith to meet emergencies, are also kept in the store-room. The entrance of the plates *d*, between the washers c^3, and plates *c*, is facilitated by the conical form of the washer-rims, and the use of bolts *c'*, and spring-washers c^2, insures a better hold on the connections than the ordinary binding-post without the spring-washers, inasmuch as the loosening effects of the jolts of a running car upon the screws are counteracted by the constant tension of the spring-washers, and the screws remain undisturbed.

To provide an alarm in cases of accident to a car-truck, a circuit-closer E, is attached between the bottom of the car and the truck, and connected by means of two conducting-wires *e e'* with the wires *a a'*, respectively. This circuit-closer E, consists of a serrated conducting-blade e^2, suitably suspended from the bottom of the car, and connected by means of the wire *e*, to the wire *a*, and also of a block e^3, firmly enclosing the blade e^2, attached by means of a chain *f*, to an arm *f'*, of the truck F, this block e^3, having a conducting-spring e^4, attached to one of its sides, which spring is, by means of the conducting-

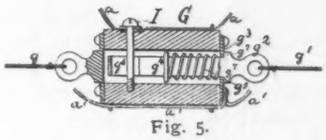


Fig. 5.

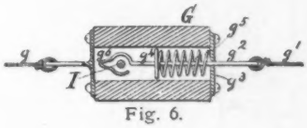


Fig. 6.

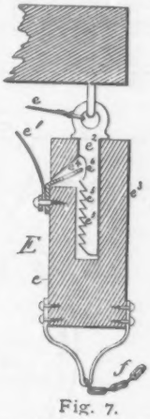


Fig. 7.

DE MIER'S ELECTRIC ALARM-SIGNAL FOR RAILWAY-CARS.

wire *e'*, connected to the wire *a'*. The end of the spring e^4, is in range of the serrations e^5, of the blade e^2, and by means of a sufficiently large notch e^6, in the blade is prevented from touching it under ordinary circumstances, the friction between the blade e^2, and block e^3, being sufficient to prevent their separation while the truck is running on the track. When the truck becomes derailed, or accidentally moved sidewise from the track, the wheels at one side of the track run upon the ground outside of the track on diagonal or curved lines, while the wheels at the other side of the truck run over or upon the sleepers of the track, whereby the truck is caused to oscillate about its center pin to an extraordinary extent, and thus the chain *f*, is jerked from its normal position and the block e^3, becomes detached from the blade e^2, and as this takes place the spring e^4, is pulled over the serrations of the blade e^2, and every time it passes over and touches one of its points it establishes a closed circuit, the effect of which is one blow of every bell-hammer against its gong from the truck to the locomotive. By the number of blows given the engineer knows the nature of the accident, and accordingly stops the train in order to avoid greater damage. The train-conductor's circuit-closer consists of a non-conducting barrel or cylinder G, suspended between two cords *g g'*, in the middle of the car. These cords pass through the ends of the car, and through two eye-bolts *h h'*, suitably fastened above the doorways. Below these eye-bolts, pendent handles h^2 h^3, are fastened to the cords, whereby the cords are pulled, and are prevented from being pulled out of the eye-bolts. The cord *g*, is fastened directly to the barrel G, and the cord *g'*, is fastened to a conducting spring-bolt g^2, in the barrel. This spring-bolt g^2, passes through a head-plate g^3, of the barrel, and is provided with a disk g^4, therein, and between this head-plate and disk a tension-spring g^5, is inserted, which keeps the curved end g^6, of the spring-bolt g^2, away from a transverse conducting-pin or screw I, in the barrel. An outer shoulder g^7, on the spring-bolt g^2, rests against the head-plate g^3, and thus limits the forward stroke of the bolt. The wire *a*, is connected with

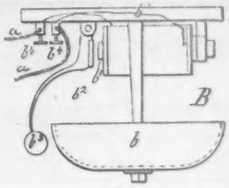


Fig. 8.

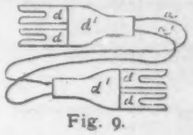


Fig. 9.

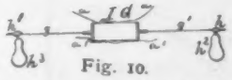


Fig. 10.

DE MIER'S ELECTRIC ALARM-SIGNAL FOR RAILWAY-CARS.

the bolt g^2, by being fastened to the conducting-plate g^3. From the screw I, the wire *a*, passes through the gong B, and then to the end of the car, as before stated. When the conductor pulls one of the cords, either inside or outside of the car, the bolt g^2, is pulled from the barrel until its curved end comes in contact with the conducting-screw I, whereby a closed circuit is established, causing the usual alarm or blow on the electric gong in the car whose circuit is closed and all cars forward, and on the locomotive, and as the conductor releases the cord the circuit is broken again, preventing wastage of battery. The conductor by a variety of signals—*i. e.*, different numbers of blows—can communicate his orders to the engineer, but he should not use the alarm-signals of the connections D and E.

This device is claimed to be simple and reliable, and can readily be attached to railway-cars at comparatively small expense.

Campbell's Snow-Sweeper.

NEIL CAMPBELL, of Brooklyn, N. Y., is the inventor of an improved snow-sweeper for railways, which is herewith illustrated and described. The invention is covered by four patents taken out by the Brooklyn Railway Supply Company, to whom the entire patent-rights have been assigned. Two of these patents cover the snow-sweeper, one the draw-bar mechanism, and one the journal-box, and each will be described separately.

In the accompanying cuts, Figs. 1 to 3, inclusive, refer to the sweeper as covered by one patent. This invention relates more particularly to a special construction of the revolving brooms employed in snow-sweepers and analogous machinery, whereby the brooms are made in a cheap and rapid manner and at the time very strong and durable,

while they may also be repaired at any time with ease and dispatch.

Fig. 1 is a longitudinal section of the improved broom, a portion being broken out from the middle; Fig. 2 an interior view of one of the broom-heads, showing at X Y Z certain portions in section on the lines *x x*, *y y* and *z z*, respectively, and Fig. 3 a plan view of a portion of a broom-head and of the parts carried thereby.

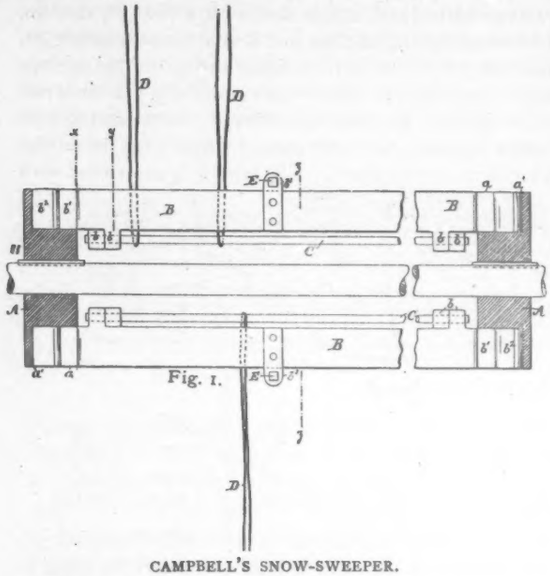


Fig. 1.

CAMPBELL'S SNOW-SWEEPER.

Two broom-heads A, are employed, keyed upon the broom-shaft at such distance from each other as the length of the broom which it is desired to form dictates. Each head A, is formed with a series of radial sockets *a*, the sockets in one head facing those in the other, and each socket *a*, terminates at its bottom—that is to say, near the outer face of the broom-head—in a cylindrical socket *a'*,

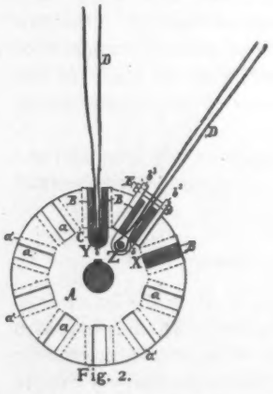


Fig. 2.

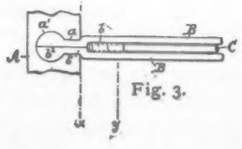


Fig. 3.

CAMPBELL'S SNOW-SWEEPER.

of larger diameter than the width of the socket *a*, as shown in Figs. 2 and 3. Between the broom-heads and parallel to the shaft extend stout bars B, hinged together in pairs by means of lugs *b*, and the rod C. The ends of these bars are so shaped, as shown at $b' b^2$, that when folded they will fit into the sockets *a a'*, in the heads A, all of the bars B, being of course of the same length, so that there are as many pairs of hinged bars connecting the heads as there are sockets in one of the heads. The whisks or sweeping-splints D, only a few of which are shown in the cuts, are bent at about mid-length and pushed over the rod C, and between the bars B, while the latter are open, until a sufficient quantity of whisks is thus hooked to a rod C, and confined between its bars B, when the latter are folded and secured in the folded position by means of bolts E, passing through lugs b^3, secured to or formed on the bars B. One pair of bars B, with their rod C, and whisks D, are termed a "broom-section." The section, prepared as described, is then placed in position by its ends being received in the sockets in the broom-heads A. It will of course be understood that the number of sockets in the heads A, and consequently the number of sections which go to make up a broom, may be varied within certain limits, and it will also be seen that the number of lugs *b*, and bolts E, and consequently the number of hinges and locking means provided for each section, may be varied according to the length of broom to be formed. In most cases the friction between the parts will alone be sufficient to keep the broom-sections in place in the heads A. If, however, this should in any case be

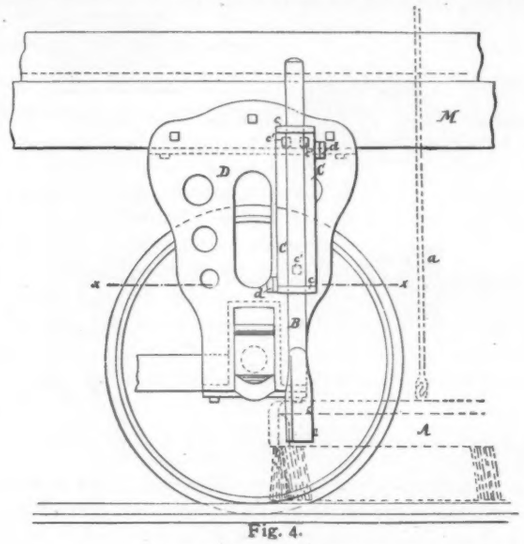


Fig. 4.

CAMPBELL'S SNOW-SWEEPER.

thought to be insufficient, a light ring or hoop may be slipped upon the head A, so as to cover the enlarged parts $b' b^2$, of the sections, thus holding them against any accidental displacement.

Figs. 4 and 5 refer to the sweeper as covered by the second patent. This invention relates to such machines in which relatively stationary oblique brooms are employed, either alone or preferably in connection with rotary sweepers, and its object is to prevent undue strains upon the bolts which serve to hold the broom-supports to the frame-work, and particularly to the pedestals.

Fig. 4 is an elevation of the novel parts, with so much of the ordinary parts as is necessary to indicate their relation thereto, and Fig. 5 a horizontal section on the line *x x* in Fig. 4.

The obliquely-placed broom A, which is shown only in part in dotted lines in the cuts, is secured at its outer end to a stout bar B, which is capable of sliding in the lugs *c* projecting from the piece C. The inner end of the broom (not represented) may be similarly connected. Means

are provided for raising and lowering the broom, as indicated by the rod *a*, which may be connected to suitable lever mechanism arranged upon the frame or platform M.

It will be seen that when the machine is moving in the direction from the left toward the right, the broom pushing against the snow and removing it from the track in a lateral direction, a very considerable strain or thrust is thereby exerted upon the broom, which thrust is of course transmitted through the bar B, to the piece C, so that if bolts alone are relied upon for securing the piece to the

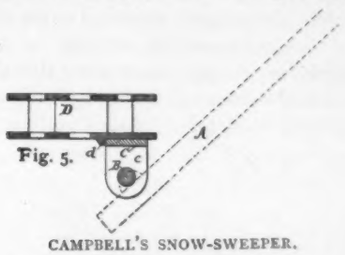


Fig. 5.

CAMPBELL'S SNOW-SWEEPER.

pedestal these bolts must be used in great numbers to prevent their being sheared off by the thrust or being loosened by the jars. In order to avoid these difficulties the pedestal D, is cast with raised portions to receive the sides of the piece C, against their lateral faces. thus receiving the entire thrust that may at any time be exerted through the broom upon the piece C. In this manner the entire resistance which is offered to the broom is transmitted to the heavy strong casting forming the pedestal,

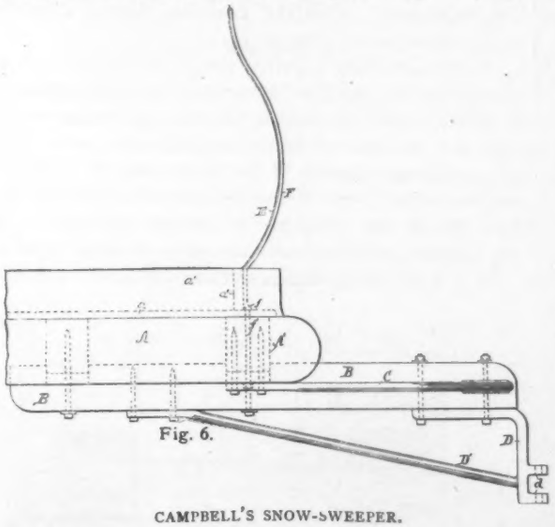


Fig. 6.

CAMPBELL'S SNOW-SWEEPER.

and through it to the frame M. The bolts *c'*, which according to this construction serve only to hold the piece C, up to its place in the recesses formed by the face of the pedestal and the projections *d*, may therefore be only few in number and comparatively light.

Figs. 6 and 7 refer to the draw-bar employed upon the snow-sweepers. This device is more particularly adapted to that class of machines in which obliquely-placed revolving brooms are employed. It relates to the construction of the end portions of the sweepers, and consists in a peculiar construction of braces, whereby not only great rigidity of the parts is secured, but considerable space gained, so that the proper working of the brooms in throwing the snow forward and sidewise is insured. The rigidity of the dash-board is also increased by an improved construction of the stiffening-ribs.

Fig. 6 is a side elevation of one end of a snow-sweeper, and Fig. 7 a plan of the same on a smaller scale.

A is the frame of the sweeper. It is covered with a floor *a*, having a raised rim of boards *a'*. B is the draft-bar, formed of a stout piece of wood bolted to the cross-beams of the frame A, in the center line of the machine. This draft-bar extends forward a considerable distance beyond the end cross-beam A', and requires, therefore, to be braced strongly against lateral strains. This is effected by means of the curved iron bars C, which have their rear ends firmly bolted to the sides of the frame A, while their front ends bent backward apply against the sides of the bar B, and are firmly bolted thereto, as shown.

The horses are attached to the machine by means of suitable eveners at *d*, which are projections from the L-shaped piece D, one arm of which is bolted to the draft-bar B, the other arm, carrying the projections, being braced by the iron bar D', the rear end of which is bolted to the draft-bar B, as shown.

Fig. 7 shows in peculiarly dotted lines the position of

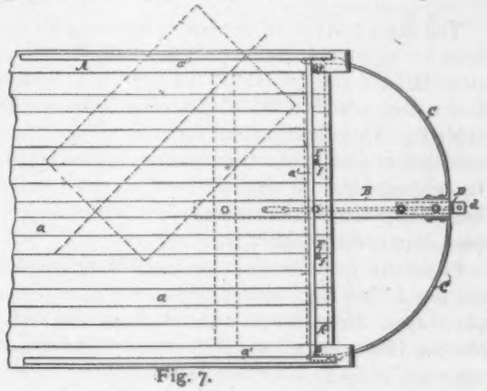


Fig. 7.

CAMPBELL'S SNOW-SWEEPER.

the revolving broom. When the machine is moving from the left to the right, the snow will be thrown forward from the broom, the latter revolving in a direction opposite to the running wheels. In certain circumstances it is important that the snow shall be thrown well forward, and yet that it shall be somewhat confined. For this purpose curtains are sometimes attached to the braces C, depending to a greater or less distance from the ground. It will now be seen that these braces C, when provided with curtains, offer a much larger space into which the snow may be thrown than if they were made to extend in straight lines, and their curved shape must therefore be considered quite an important element.

The dash-board E, rises from the raised front rim *a'*. It is preferably made of thin sheet-iron strengthened by wrought iron ribs F. These latter are made to extend down to the floor *a*, thus serving also to hold the rim-board *a'*, in a vertical position. These ribs F, at the point where they reach the floor *a*, are formed with broadened seats *f*, from which extend the shanks *f'*, passing clear through the end cross-beam A, and being secured on the under side thereof by means of nuts, as shown. This construction affords a very strong and reliable support for the dash-board.

Figs. 8 to 11, inclusive, refer to the journal-box for the

snow-sweepers. This journal-box may be advantageously employed for receiving that end of the broom-shaft which is remote from the driving mechanism. The improved box is a single casting and forms not only the bearing for the shaft but has a grease-box, means for attaching the lifting-rod and a lug formed with an eye, whereby it is guided upon a vertically-extending bar.

Fig. 8 is a longitudinal section; Fig. 9 an end view seen from the side on which the shaft enters; Fig. 10 an end view seen from the opposite side, and Fig. 11 a plan view.

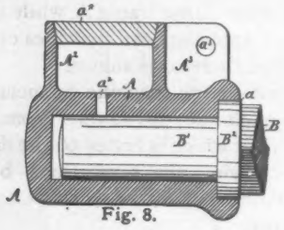


Fig. 8.

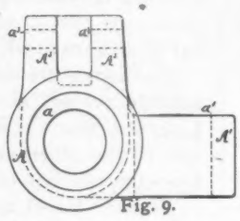


Fig. 9.

CAMPBELL'S SNOW-SWEEPER.

The main body A, of the box is formed with the hole or bore for receiving the end or journal B', of the broom-shaft B. At the mouth of the bore is an enlarged portion *a*, into which is fitted the collar or flange B^2, of the shaft B. This arrangement not only tends to prevent the entrance of dust and other foreign bodies to the journal B, proper, but also retards to some extent the loss of lubricating material, in case such material should have been supplied too liberally.

From the main body A, projects in a lateral direction the lug A', having a hole *a'*, which when the box is put in place upon the machine receives a guiding-rod to guide the box in its upward and downward movements. Above the main body A, is formed a grease-box A^2, which does not, however, extend the extire length of the casting. It

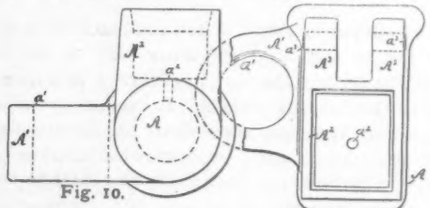


Fig. 10.

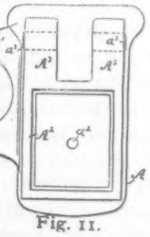


Fig. 11.

CAMPBELL'S SNOW-SWEEPER.

communicates through one or more holes a^2, with the interior of the main body, whereby the journal is kept properly supplied with lubricating material. A suitable quantity of the latter is placed in the box A^2, which is then preferably closed by a cover a^*. The sides of the box A^2, are extended forward and considerably thickened, as shown at A^3, forming lugs between which may be received the opening-bar (not shown) by which the box may be raised and lowered on the sweeper. The bar is preferably pivoted to the lugs A^3, by a pin (not shown) extending through the holes a^3.

Snow-sweepers constructed as above described, and with the various devices mentioned, are claimed to perform their work reliably and satisfactorily. The machines are simple in construction and not liable to derangement.

Taggart's Car-Coupling.

FRANK J. TAGGART, of Adrian, Mich., is the inventor of an improved form of car-coupling, the construction and operation of which are shown in the accompanying cuts. Fig. 1 is a vertically longitudinal section of the device, showing the draw-bar in position after it has entered the draw-head and is coupled, dotted lines showing the position to uncouple; Fig. 2 an end view, and Fig. 3 a vertical cross-section on the line *x x* in Fig. 1.

A is the draw-head, provided with the rectangular mouth *a*, having outwardly beveled or flaring edges *a'*. A' is a shoulder on the inner lower side of the mouth *a*, with which the draw-bar engages to effect the coupling. B is a partition or buffer-head extending down nearly to

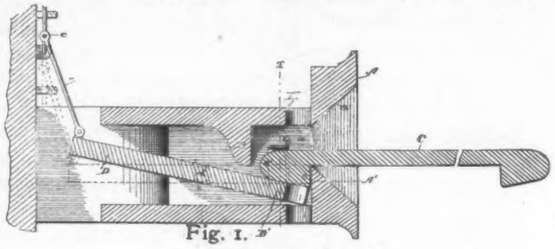


Fig. 1.

TAGGART'S CAR-COUPLING.

the bottom of the inside of the draw-head, its lower edge being in a plane with the upper edge of the shoulder A'. Against this partition the draw-bar strikes when it enters the draw-head. C is the draw-bar, having shoulders *c*, and pointed or rounded ends *c'*.

As the cars come together the pointed end of the draw-bar strikes against the beveled edges of the mouth *a*, and is guided into the mouth, the draw-bar being so placed that the shoulders *c*, are on its under side, the weight of the draw-bar causing it to drop down as it enters the draw-head, and one of the shoulders *c*, engages with the shoulder A', and couples the cars, the partition B, limiting the distance the draw-bar enters the draw-head.

D is a releasing-lever fulcrumed at *d*, and having the

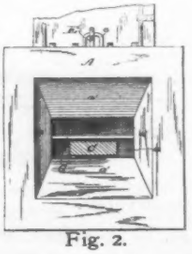


Fig. 2.

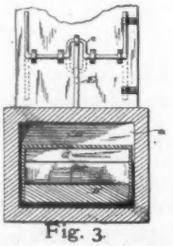


Fig. 3.

TAGGART'S CAR-COUPLING.

arm D', projecting under the partition B, and completely filling the bottom of the outer end of the draw-head. When this lever is raised, its upper side is in a plane with the upper edge of the shoulder A', as shown in dotted lines in Fig. 1, The inner arm of the lever is connected by a rod E, with the crank-arm *e*, by means of which the lever is operated. The crank-arm is secured to the end of the car, and any suitable device may be used for locking it so as to hold the lever in any desired position.

When it is desired to uncouple the cars, the crank is turned down, forcing the inner end of the lever down and raising the arm D', which lifts the draw-bar and releases it

from engagement with the shoulder A', and uncouples the cars.

G is a metal retaining-strap secured to the outer end of the lever D, and when this outer end is lowered the strap engages with the top of the draw-bar and prevents it from getting out of position. This strap also serves to hold the draw-bar in position to enter the draw-head of an approaching car, and by raising or lowering the lever the draw-bar can be given the proper pitch. The beveled edges of the mouth of the draw-head permit the draw-bar to enter the mouth of the draw-head of an approaching car at any angle. This is a great advantage, especially in coupling cars in which the draw-heads are in different planes. If desired, instead of the retaining-strap a movable jaw secured by suitable guides to the top of the inner sides of the draw-head and operated by a spring may be used, the spring forcing the jaw down on top of the draw-bar.

H is a pin-hole in which a pin can be inserted when it is necessary to couple with a car using the old style of link-and-pin coupler, A pin-hole can also be made in either end of the draw-bar, as shown in dotted lines. It will thus be seen that with this invention the operation of coupling and uncoupling can be effected without going between the cars, as it is only necessary to turn the crank to place the draw-bar in position to couple or uncouple.

The inventor claims that this form of coupling is simple, durable and efficient, and can be readily attached to any form of car at small expense.

Pitcher's Spark-Arrester.

JOHN M. PITCHER, of Sugar Creek, Ind., is the inventor of an improved spark-arrester for use on locomotives, stationary or portable engines, the construction and operation of which are shown in the accompanying cuts. Fig. 1 is a side view of a boiler with the device attached; Fig. 2 a vertical cross-section of Fig. 1, on the line X X, and Figs. 3 and 4 represent modifications of the spark-arrester, in sectional view, as applied in Fig. 1.

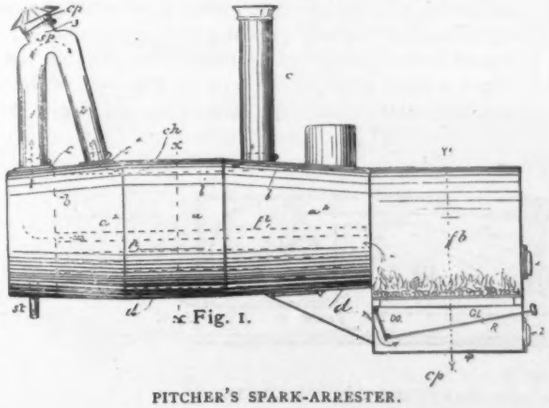


Fig. 1.

PITCHER'S SPARK-ARRESTER.

In Fig. 1, *b* indicates in dotted lines the boiler, with the ordinary fire-box *fb*, bridging *bb*, and flues *fl*. *a* is a drum or jacket, constructed of sheet or boiler-iron, of any desired strength, and made in three sections. The central section *a*, is a plain cylinder. The two end sections *a'* and a^2, are conical. These sections are firmly riveted together to form a steam-tight casing around the boiler, when attached thereto at the two ends, as indicated in the cuts, and supported by a suitable frame. C is a collar attached to the boiler over the bridging-chamber *bb*, and C' is a collar attached to the top of the section *a'* of the drum *d*, to receive the spark-arrester *sp*, which consists of three-sections of pipe, 1, 2 and 3. Section 1 of this pipe fits over the collar C, and receives the sparks and smoke from the bridging-chamber *bb*, as indicated by the arrows, discharging the same into section 2 of the arrester, through which the sparks and smoke pass and discharge

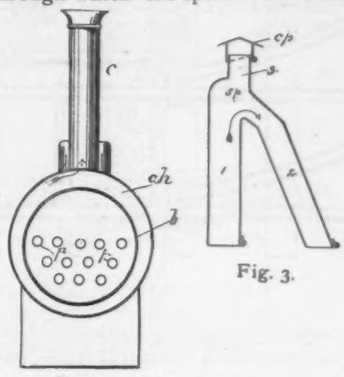


Fig. 2.

Fig. 3.

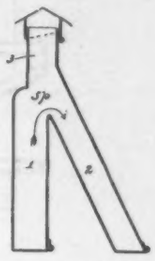


Fig. 4.

PITCHER'S SPARK-ARRESTER.

into the chamber *ch*. Sections 1 and 2 of the spark-arrester may be connected at the upper ends, as indicated in Figs. 1, 2 and 3. In either case a discharge-pipe 3, is so arranged that one-half thereof extends over the ascending section 1, and the other half over the descending section 2, of the spark-arrester, as shown. *cp* is a cap made to fit over the top of section 3, provided with a hinge, by means of which it is opened and closed at will. *c* is a smoke-stack attached to section a^2, of the drum *d*, and communicating with the chamber *ch*. *st* is an exhaust-steam pipe through which steam or air is injected into the bridging-chamber *bb*. The chamber *ch*, is so adjusted as to leave a larger space above than below the boiler, as indicated in Fig. 2.

The ascending section of the spark-arrester *sp*, is placed over and perpendicular to the bridging-chamber *bb*, and joined to the descending-section 2, at the upper end. Section 2 inclines downward and connects with the chamber *ch*, of the drum *d*. Sections 1 and 2 connect with section 3, which is so arranged as to project half over the ascending and half over the descending sections, and is provided with a hinged cap *cp*, which can be opened and closed at will. The space between sections 1 and 2 of the spark-arrester is covered by a concave sheet, as shown in Figs. 3 and 4.

The method of operating the device is as follows: Before firing up, the cap *cp*, is opened, which allows the smoke to issue through section 3 of the arrester. When sufficient steam has generated to set the machinery in motion, the cap *cp*, is closed and the exhaust-steam is injected into the chamber *bb*, through the steam-pipe *st*, creating a draft, which forces the smoke and sparks up through section 1 of the spark arrester, down through section 2, and into the chamber *ch*, as indicated by the arrows.

It is claimed by the inventor that his device is simple in construction and reliable in action, and that by its use a considerable economy in fuel is effected.

Ries' Automatic Alarm, Signaling and Safety Devices for Railways.

ELIAS E. RIES, of Baltimore, Md., is the inventor of an improved alarm signaling and safety system for railways, which is herewith illustrated and described. The invention is designed not only to promote safety in the running of trains by giving automatic warning to the engineer in case of danger of any kind on the track ahead of him, and by bringing his train to a standstill if the warning signal or signals are disobeyed, but also to prevent injury to persons or property at road-crossings and other points by giving early and positive warning of its approach. Briefly stated, the objects of the invention are as follows: First, to give warning of the approach of a train to persons at road-crossings, stations and curves, by means of the usual whistle signals, given automatically at a uniform distance from such points; second, to give warning to the engineer himself in case of danger ahead from a misplaced switch, open drawbridge, or similar cause, in the event of his failing to notice and obey the ordinary visible signals usually placed at such points; and third, to stop the train automatically by cutting off the steam supply and applying the brakes, in case the engineer, through disability, negligence or other cause, allows the train to proceed after being warned by an audible "misplaced switch" or "open drawbridge" signal to bring his train under control.

In order to carry out these objects, each locomotive is provided with an automatic signaling mechanism arranged to give upon the locomotive whistle any desired one of a code of audible signals, and the mechanism is operated to give these several signals by means of inclined planes of corresponding different heights arranged at the proper points along the railway. The crossing and station inclines are fixed, but the switch and drawbridge, as well as the train-stopping inclines, are movable or pivoted, and so arranged that upon opening the switch or draw the inclines will be brought into a position to enable the contact-

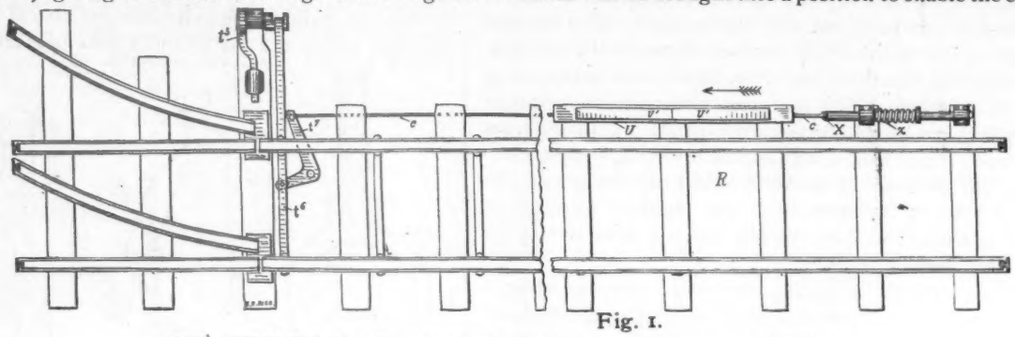


Fig. 1.

RIES' AUTOMATIC ALARM, SIGNALING AND SAFETY DEVICES FOR RAILWAYS.

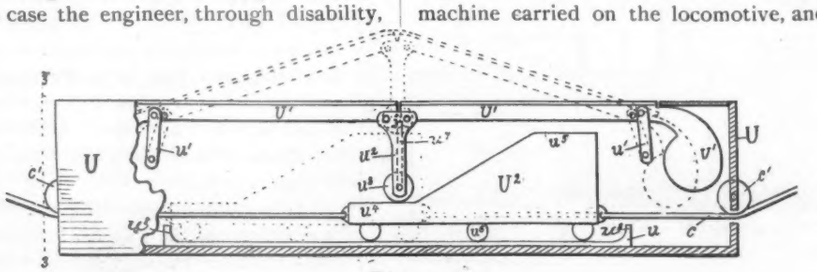
wheel on the engine to ascend them and operate the signaling mechanism.

In the accompanying cuts, Fig. 1 is a plan view of a railway switch, showing the movable switch-incline and the method of connecting it with the switch-rails; Fig. 2 a side elevation of the fixed crossing and station inclines; Fig. 3 a side elevation, with part of its casing removed, of the form of incline shown in Figs. 1 and 4; Fig. 4 a general view, in three parts, of a drawbridge with its approach, showing the distant, intermediate and train-stopping inclines and their operating mechanism; Fig. 5, a side elevation of a locomotive, giving a general view of the signal mechanism and train-stopping apparatus, and showing an incline alongside the track in an elevated position; Fig. 6 a front view, with the cover removed, of the signal machine carried on the locomotive, and Fig. 7 an end view of the same with part of the case removed. Fig. 8 is a detail view of the signal-wheels and a diagram of the respective signals given by them.

Fig. 2.

RIES' AUTOMATIC ALARM, SIGNALING AND SAFETY DEVICES FOR RAILWAYS.

Referring to Fig. 5, B is a vertically guided sliding-bar having a friction-roller C, at its lower extremity, its upper end being connected to the rack-bar of the signaling machine. A spiral-spring D, bears downwardly against a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collar E, on the sliding-bar, the downward movement of the bar being limited by the stop e^3, so that the wheel C, in its lowest position is nearly two inches above the rail surface, sufficient to enable it to clear all frogs, switch-rails, etc., along the line.

ing the descent of the sliding bar to its normal position.

The signaling machine, shown in Figs. 6 and 7, is provided with five signal-wheels, J, J^1, J^2, J^3, J^4, shown in detail in Fig. 8, each of which is capable of giving upon the locomotive whistle a signal corresponding in form to

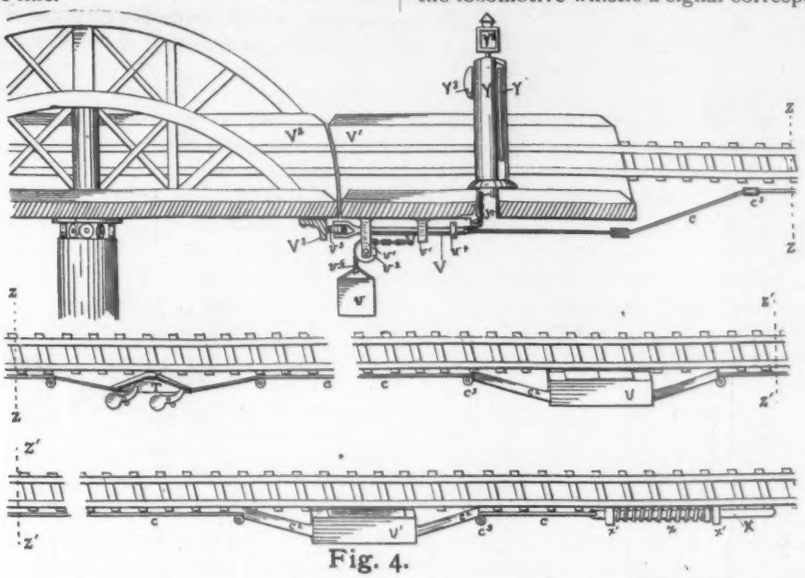


Fig. 4.

RIES' AUTOMATIC ALARM, SIGNALING AND SAFETY DEVICES FOR RAILWAYS.

At a distance of 500 yards from each road-crossing and station, an incline of the kind shown in Fig. 2 is fixed, the crossing incline being six, and the station incline seven inches in height above the rail surface. When the roller C, and rod B, are lifted in passing over one of these inclines, the only mechanical work done is to compress the spring D. The signaling machine is operated, *after the wheel has left the incline*, by the action of the spring in expanding, the particular signal corresponding to the height of the incline being given upon the whistle during the descent of the sliding bar to its normal position.

the elevations and depressions on its periphery. These wheels are placed together on the same shaft, on which they are free to revolve. Above the signal-wheels, secured to the sleeve B^2, is the signal-lever L, whose outer end is connected with the whistle lever *w*. The rack-bar that enters the machine engages with a toothed pinion, which with the notched cam H, is keyed to the shaft supporting the signal-wheels. When the rack is lifted by a "crossing" incline, the pinion G, and cam H, will be revolved until they have made one revolution, whereupon the pawl *h*,

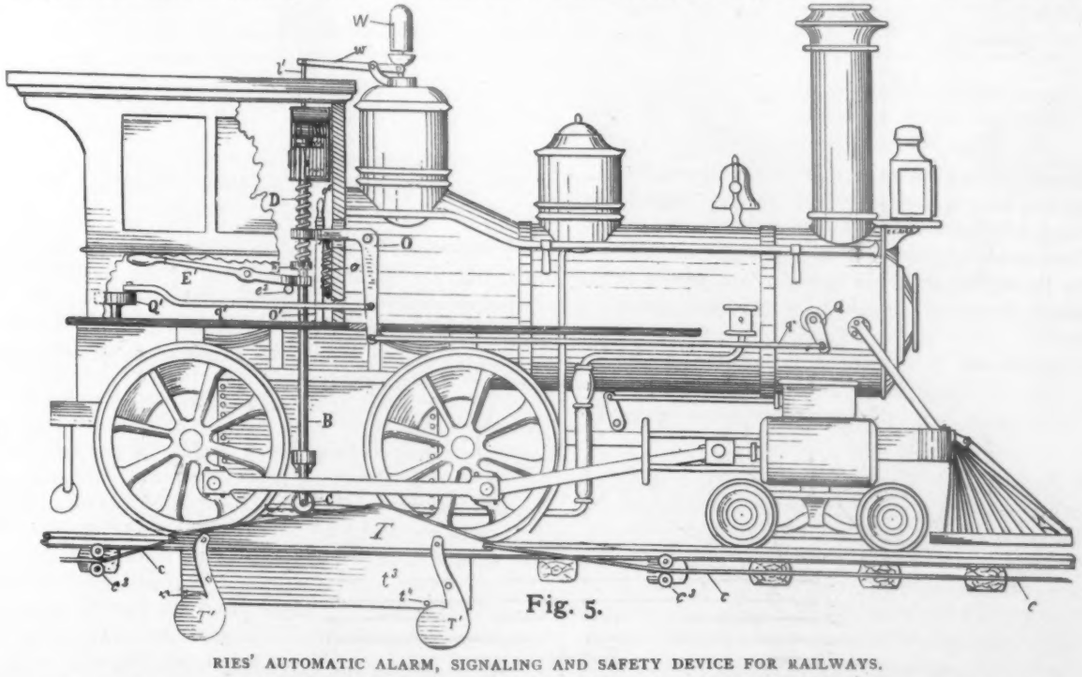


Fig. 5.

RIES' AUTOMATIC ALARM, SIGNALING AND SAFETY DEVICE FOR RAILWAYS.

will fall into the notch h', as shown, the signal-wheels meanwhile remaining quiet. The spring D, will now force the bar B, downward, revolving the pinion G, in the opposite direction, and with it the cam H, and the signal wheels. The elevations on the first wheel J, will now

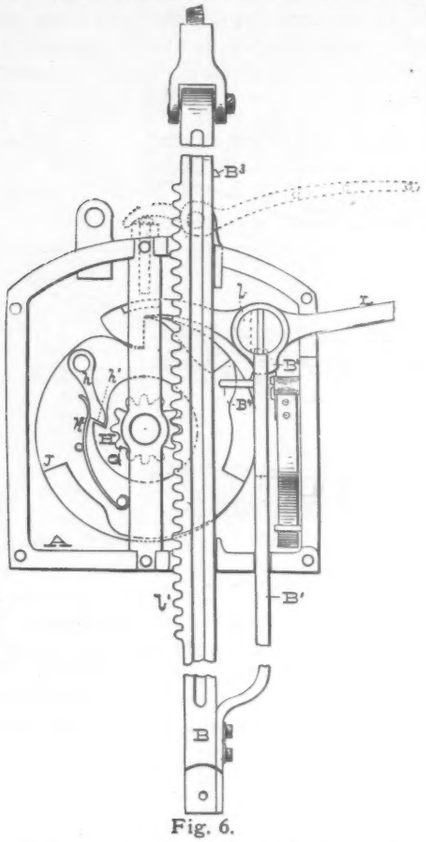


Fig. 6.

RIES' AUTOMATIC ALARM, SIGNALING AND SAFETY DEVICES FOR RAILWAYS.

successively elevate the inner end of the signal lever L, thus causing it to sound the "road-crossing" signal (two long blasts followed by two short blasts) upon the whistle W. The descent of the bar B, is regulated and rendered uniform by means of an air-cylinder, not shown in the cuts, whose piston-rod is attached to the upper end of the rack-bar B.

To the rack-bar B, is secured a transferring cam B', having its upper end tapered on one side. When the sliding-bar is elevated by a "station" incline, the point of this wedge enters through a slot in the shaft *l*, and moves the sleeve B^2, forward until the signal-lever is over the second or "station" signal-wheel J'. The lever is held in this position, while the wheels are revolving, by one of the teeth of the lever N^2. Just before the revolution is completed, however, a pin B^3, on the rack depresses a projection B^4, of the lever N^2, and thereby releases the signal-lever, which, under the pressure of a spiral-spring on the shaft *l*, immediately resumes its normal position

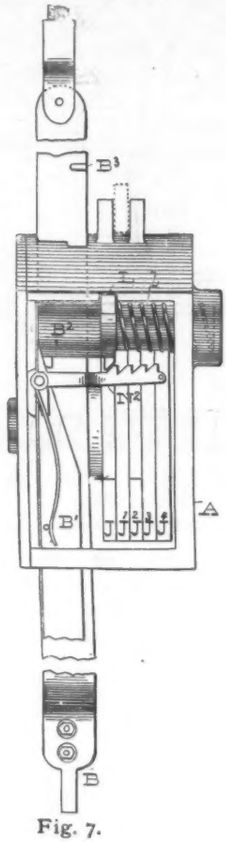


Fig. 7.

RIES' AUTOMATIC ALARM, SIGNALING AND SAFETY DEVICES FOR RAILWAYS.

over the wheel J. In this manner, for each additional inch that the sliding-bar is lifted above the first four inches necessary to a revolution of the signal-wheels, the signal-lever is moved to a corresponding different wheel.

Figs. 3 and 5 represent two forms of movable inclines

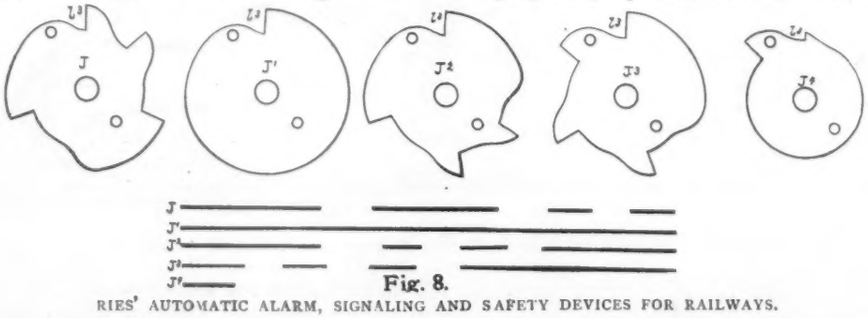


Fig. 8.

RIES' AUTOMATIC ALARM, SIGNALING AND SAFETY DEVICES FOR RAILWAYS.

for switches, drawbridges, etc., the former consisting of two counter-weighted arms U U', capable of being elevated by a slight forward motion of the shoe U^2, in the enclosing case U, and the latter being arranged to move bodily

in a vertical plane, when the small wire connecting-cable c, is moved. When the inclines are elevated, their weight and the pressure of the sliding-bar B, is sustained by the shoe U^2, and the pins l^4 l^4, respectively, and ample provision is made to compensate for variations in the length of cable due to expansion or contraction.

Fig. 1 illustrates the track apparatus as applied to a switch. The case U, is embedded in the road-bed at a distance of 400 yards from the switch. The free end of the signal-wire c, that connects with the interior shoe U^2, —which in this instance faces in an opposite direction from that shown in Fig. 3—is attached to one arm of a bell-crank lever l^7, whose other arm is secured to the bar l^6, connecting with the switch-lever. When the switch-rails are at safety, as shown, the cable c, is drawn forward, and the actuating spring x, is compressed. If now the tension on the cable is relaxed by moving the switch to the siding, or if the cable should be accidently broken, the spring x, will draw forward the shoe U^2, and elevate the arms U U′, to the proper height for giving a "misplaced switch" signal on the whistle of a passing locomotive. When the switch-rails are again moved to the main track, the shoe U^2, is drawn back, and the signal-arms descend to their normal position.

When the sliding-bar B, on the engine is lifted by a "down-brakes" incline, which is the highest of the series, the collar E, is raised sufficiently high to come in contact with and lift one arm of the bell-crank lever O, whose other arm is then operated by means of rods q and q', respectively, to cut off the supply of steam to the cylinders and apply the air, vacuum or other brakes to the train. The arm of the bell-crank lever O, is caught and retained in position by one of the teeth o^6, on the lever O′, until released by the engineer.

It should be stated that the sliding-bar B, and the signaling and train-stopping apparatus on the locomotive are placed as shown in Fig. 5, in order to facilitate description, an entirely different arrangement being employed in practice.

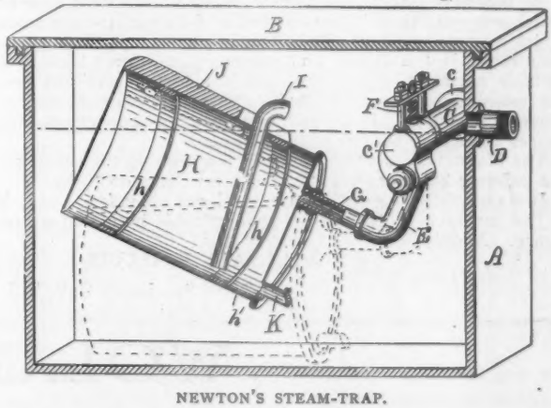
Fig. 4 shows a number of inclines operated by the same cable. An inclined guide-rail V^3, normally holds back the bar V, against the downward pull of the weight v. When the draw V^2, opens, the guide-rail V^3, gradually recedes and allows the weight v, to descend and elevate the alarm inclines. The operation of this system of signals is as follows: When a locomotive approaches an open drawbridge, it first comes to the distant incline U′, which gives a "drawbridge" alarm upon the whistle, and is a signal to the engineer to continue at slower speed to the next incline. Should the draw be closed in the interval, the second incline U, will give no signal, and the engineer will continue his way unobstructed across the bridge. Should the draw, however, be still open, this incline will repeat the alarm on the whistle, upon which the engineer will come to a full stop before reaching the "down-brakes" incline T, within hearing and in view of the gong Y^3, and the home signal Y. The train will remain here until the bridge closes, whereupon the alarm-inclines descend, the signal-arm Y′, and lamp Y^2, return to the "safety" point, and the gong Y^3, rings to call the engineer's attention to the fact that the track is clear, and that he may proceed. Should the engineer, however, fail to obey the warning signals of his whistle and continue past the intermediate incline U, without stopping, when the bridge is open, the train will be automatically stopped upon reaching the alarm-incline T, which, in the manner before described, shuts off the steam, puts on the brakes, and gives a "down-brakes" signal on the whistle W, of the locomotive.

From what has been said it will be seen that this system of signaling and safety devices can be applied to prevent accident and to facilitate the movement of trains in a number of other ways in addition to those described, and it is therefore unnecessary to dwell upon its particular advantages.

The invention is stated to be only the beginning of a new departure in methods of railway signaling, and a number of other applications are now pending before the Patent Office embracing several important improvements. The letters patent for the invention above described contain 75 claims, nearly all fundamental in their character, and patents have already been taken out in all the principal foreign countries. The apparatus has been and is still being thoroughly tested, with highly satisfactory results, on one of the Baltimore railways, and the inventor, a young mechanical and electrical engineer of Baltimore, expects very soon to have the system in practical daily operation. Any further information regarding this system can be obtained from the Ries Automatic Railway Signal and Safety System, A. H. Henderson, general manager, Baltimore, Md.

Newton's Steam-Trap.

ROBERT NEWTON, of Providence, R. I., is the inventor of an improved form of steam-trap, which is herewith illustrated and described. The device is of that class of steam-fixtures which are designed to discharge the water



NEWTON'S STEAM-TRAP.

of condensation without allowing any escape of steam; and the object of the invention is to increase the rapidity of action of this class of devices and to economize the amount of space required by the floating chamber; also, so to place the valve-chamber and the inlet that they shall be below the water-level, and thus produce a better lubrication of the valve and a more thorough separation of the liquid of condensatson from the steam.

The accompanying cut shows the device in longitudinal vertical section.

A is the tank or receptacle in which the water of condensation is collected, and in which the valve is operated,

B is the cover of the tank, C the tubular inlet, and D the outlet, the water-line being indicated by a broken line on a level with the outlet through which the water escapes, and by which the water-level is maintained. At one end the inlet C, extends through the side of the tank and carries a flange or shoulder *c*, between which and the inner surface of the side of the tank any suitable packing may be placed. The opposite end of the inlet is provided with a valve-chamber *c'*, to which a tubular elbow E, is movably attached. G designates a tubular arm or pipe which connects the elbow F, with the floating chamber H. This chamber is of cylindrical form, and is braced internally by two rings *h h*. The chamber is also provided with the small hole *h'*, through which the chamber is gradually filled. I is the discharge-pipe or vomit, J the weight for the chamber H, and K the drip-pipe, the outer end of which is closed by a valve *k*, which opens outwardly.

By the peculiar construction above described the inlet and its valve are submerged, and thus a more petfect discharge of the water of condensation is effected, while at the same time the valve is lubricated. When the water of condensation is to be discharged, it escapes through the pipes I and K, and hence a very rapid action is produced. The chamber H, by its cylindrical form, not only affords an opportunity for the use of the weight J, but occupies much less space than if formed otherwise. This chamber may be used with either the outlet I, or the outlet K, alone, and still maintain the advantage of rapid discharge.

The purpose of the weight J, is to steady the action of the chamber H, and in order to insure the proper action of the weight it is rendered adjustable upon the chamber by means of bolts which work through elongated slots in the weight, and by which the weight is secured to the chamber. The end of the weight is recessed so as to permit of the movements of the weight. These features are shown in the cut, and by them the action of the weight in facilitating the fall and retarding the rise of the chamber is properly regulated.

This device is now controlled by the Providence Steam-Trap Company, of Providence, R. I.

A BOILER has been made in France in which the metallic surface exposed to fire does not touch the water. The boiler, it is said, cannot become red hot, but is enveloped all over by the same temperature. The vaporization is very great, and the last drop of water can be converted into steam without any danger of explosion.

THE attention of the readers of the JOURNAL is directed to the advertisement of Mr. S. Davis' Safety Truck-Appliance, appearing in this issue. Mr. Davis' device appears to be receiving the unanimous endorsement of the Canadian press, and indications point to its early adoption by a number of leading railways.

DAVIS'

Improved Electro-Magnet

For Railway and other Signals.

By means of this improved instrument, a full description of which was published in the November JOURNAL, the armature which carries the signal will be turned into one position whenever the circuit is closed, and automatically turned back by a suitable spring whenever the circuit is open, provided one Electro-Magnet is used; while if two Magnets are used the position of the signal will depend entirely upon the current that passes through either one of the Magnets.

The Magnet can also be placed in any position to operate all the different kinds of signals either in revolving or lifting.

It is especially adapted for use in railway signaling.

The inventor will dispose of this valuable patent at a low figure. Address

WILLIAM E. DAVIS,
571 Third St., Jersey City, N. J.

Cuneo's Car-Coupling.

Simple, Automatic in its Action, and applicable to any form of Railway-Car.

Cars employing this Coupling can be coupled to cars using the old link-and-pin coupler.

An illustrated description of this valuable Coupling appeared in the AMERICAN RAILROAD JOURNAL for December, 1885.

Full particulars will be furnished by addressing

JOHN CUNEO,
Vicksburg, Miss.

WOLCOTT'S

PATENT

Dumping-Car and Car-Dump.

This invention furnishes a means for unloading Grain, Coal, Ores, and other Freight, from Platform, Gondola or Box-Cars, and by its use one or more Cars can be dumped at the same time by an extended Dump-Track which may be coupled out to any desired length.

A full description of both devices, with their application, was published in the November JOURNAL.

For particulars, address the Inventor and Patentee,

ANSON WOLCOTT, Wolcott, Ind.

GENERAL OFFICES **THE ROTE AUTOMATIC BRAKE COMPANY,**

MANSFIELD, OHIO, *November 3d, 1884.*

To the Westinghouse Air Brake Company, Pittsburgh, Pa.:

GENTLEMEN:—Understanding from your published announcements that you recommend your brake for freight-train use we respectfully invite you to a complete and searching public test of its merits in competition with the *Rote Automatic Brake* This test to be made in so complete and critical a manner as to show all the railroads of the country, as well as the Railroad Commissioners of the various States, which of the two brakes is the one which should be used; for the test will, we are certain, leave no doubt in the minds of any witnessing it.

To insure the proper management of the test we suggest that you choose one person, we another, and these two a third person, all three to be well known as capable and honorable rolling-stock experts, to conduct the test, their expenses to be jointly borne by you and by us.

An invitation to witness the test to be extended to the General Officers of Railroads and all State Railroad Commissioners to the members of the National Car-Builders Association, and to the Railroad and daily press.

The test to be at such time and place as may be mutually agreed upon, but we suggest that the proper place would be on some road having high grades and sharp curves, so that both brakes may have as hard and complete a test as possible. As is necessary to make the test searching and complete, and as all railroads wish to increase the length of their trains and only wait for a brake which will enable them to do so, we think each train should be made up of 50, 60 or 70 cars, as you may prefer, or, if you think best, of even more cars.

Your company to supply your train and engines, we to supply ours.

The following points, among others, to be considered and reported upon:

Cost of equipping trains.

Simplicity.

Freedom from breakage.

Certainty of action.

Effectiveness.

Cost of maintaining.

"Flatting" of wheels.

Any other points submitted by you or by us in writing to be added to the above.

The brakes or trains are to be tested in every manner and under all conditions which practical railway service may suggest, including yard as well as line service.

Among others the following tests are to be applied to both trains:

1st.—Each train is to be (part of the time) run by engineers and crews who have never operated either brake and who are wholly unfamiliar with them.

2d.—The trains are (part of the time) to be partly made up (as nearly all freights are everywhere) of foreign cars, which have neither your nor our brake on, so that the cars having your break or ours on shall be widely and irregularly separated from each other.

3d.—The locomotives drawing your train and ours to be exchanged, from time to time, and draw each others trains.

4th.—Two locomotives equipped as so many freight engines and tenders are, with hand-brakes instead of steam or air brakes, are to be substituted for the two engines used in the test part of the time. Any brake which will not work properly if this is done, you will admit, can be of little practical value in actual service.

5th.—From time to time each train is to be stopped and foreign cars (not equipped with either your brake or ours) are to be run into it, at irregular intervals, just as actual service requires constantly.

6th.—In the making up of trains, etc., crews are to be exchanged at random, so that the test may fully illustrate the convenience of operating each kind of brake in actual ordinary service.

7th.—Frequent short runs, stops and quick starts are to be made.

8th.—A series of yard tests are to be made, showing the action, convenience, etc., of the two brakes.

We mention a few necessary tests only, and you and we, as well as the test committee, are to add any number of others, it being distinctly understood that if you decline any test proposed by us, or we decline any proposed by you, it shall be condered an explicit and positive admission of inferiority.

This rule must in every case be strictly observed, namely: *Both brakes must be tested in precisely the same manner*, so that there may not only be absolute fairness, but no room for suspicion even of anything else.

You have been in the brake field a long time, have profited justly and largely from the patronage of railroads, and we are sure will welcome this plan for allowing your patrons and the American public to judge for themselves which brake should come into universal use.

Having proper confidence in the merits of your brake we know you will gladly and promptly accept our proposition herein made, as you must feel that the test will be complete.

The railroad public is a very fair-minded, capable body, and will most horoughly appreciate and fully recognize the equity and fairness of our offer to you, and, in common with business-like people everywhere, will naturally (and, we are sure you will admit, properly) consider it a virtual confession of inferiority and a public admission that the Westinghouse Brake is inferior to the Rote Brake and that it is unfitted for general freight service, should you decline or neglect to avail yourselves of the proposition we make you herein.

Permit us to add in closing that we wish to express to you our desire to have this communication received in the spirit in which it is sent, and to have it express to you our wish for a full, fair and searching test of the two articles in the relative merits of which the railroad interest is *primary* and that of the owners even secondary. Respectfully,

THE ROTE AUTOMATIC BRAKE COMPANY,

Per M. D. HARTER, President

INDISPENSABLE TO ALL INTERESTED IN RAILWAYS.

POOR'S MANUAL OF RAILROADS

For 1886.

The NINETEENTH Annual Number of this Standard Work will issue in June, 1886, enlarged with many new and interesting features. The work contains complete and exhaustive information concerning every Railway Company, Stock, Bonds, Debt, Earnings, Expenses, Dividends, Officers, Etc., Etc., Maps, Etc.

ROYAL OCTAVO, CLOTH, 1400 PAGES. PRICE, $6.00 PER COPY.

1. A List of Officials of every Railway Company in the United States, Canada, Mexico, Central and South America, West Indies, Great Britain, Etc.
2. A List of Officials of Street-Railroads (Tramways) in the same countries.
3. A List of the Directors of all Railway Companies and auxiliary companies in North America, alphabetically arranged, with their addresses.
4. A List of the Officials of organizations auxiliary to the Railway System—such as Fast Freight Lines and Transportation Companies, Bridge and Union Depot Companies, Packet, Steamship Companies, Parlor and Sleeping Car and Equipment Companies, Express and Telegraph Companies, Etc. Etc.
5. A List of the Officials of Industrial Enterprises dependent on Railways—such as Locomotive, Car and Bridge-Builders, Rail-Mills, Etc.
6. A List of Officials of leading Exchanges and Commercial Associations throughout the country.
7. A List of the leading Contractors of the country, whose specialty is the construction of Railways.
8. A List of Officials of new Railways now in progress.
9. An alphabetical list of the officials of all American Railways, with convenient system of reference showing the lines with which they are connected.

And other interesting features now first presented in any publication.

A NEW AND EQUALLY IMPORTANT WORK.

Poor's Directory of Railway Officials and Railway Directors.

The First Annual Number to be published in April, 1886. PRICE, $2.00 PER COPY.

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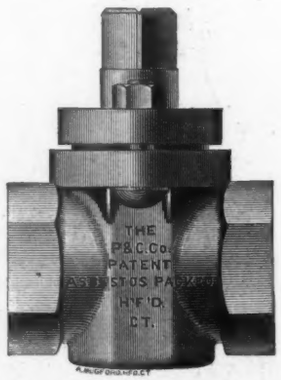
Of All Sizes and of Every Description for Railway Use.

Portable Platform Scales.

The One Lever Hancock Inspirator.

The Best Boiler Feeder known for Locomotives.



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Double Acting Compound Lever Jack, For Railway Use.

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Leave Boston for GRAND CENTRAL DEPOT, NEW YORK, at 10.00 A.M.: returning, leave New York at 11 A.M. and 11.35 P.M., week days. Pullman Palace Cars on night train.

THE NORWICH LINE between BOSTON and NEW YORK

Steamboat train leaves Boston 6.30 P.M., arrives at New London at 10.15 P.M., connecting with the new steamer CITY OF WORCESTER, Mondays, Wednesdays and Fridays, and CITY OF NEW YORK, Tuesdays, Thursdays and Saturdays. Returning, steamer leaves Pier 40, North River, New York, at 4.30 P.M., connecting at New London with train leaving at 4.05 A.M., arriving in Boston at 7.50 A.M. Good night's rest on the boat.

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A. C. KENDALL, Gen'l Pass. Agent.

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A New and Beautiful High-Art Decoration for Interiors of Railway Cars.

This is a patented process of painting on wood panels to faithfully represent Inlaid Woods. Leading Manufacturers who are now using it, claim that it is superior, as a means of interior decoration, to anything yet discovered, and for these reasons: it is done on the natural wood panel; is finished smooth, consequently there are *no reliefs nor recesses to harbor dust or dirt;* is impervious to moisture and unaffected by any ordinary heat; is perfectly durable and admits of great diversity of treatment—in both colors and designs—faithfully imitating all the beautiful growths and colors of the most expensive *natural woods*.

For ceiling work and for cars (steam or horse) we use from choice, three-ply wood, which is bent to any curve desired, and faced with hard white or bird's-eye maple, silver birch, oak, or basswood. Where it is desired to have the panel dark and ornament light, we can do so, but generally prefer to work on light-wood grounds. The method to be pursued in ordering "MOSAIC-INLAY" is to send correct diagrams, giving sizes of panels and car lines with length and breadth of car ceiling. We will then send you ceiling-panels, ready to place in position, *beautifully decorated with original designs* and at a nominal cost.

Panels decorated in "MIOSAIC-INLAY," are in use in more than 30 of the principal street-railways in the United States, so that the process has long since passed the experimental stage and is an assured success.

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E. F. DIETERICHS'

Cylinder, Engine and Machinery Oils

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COLOR MAKERS,

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Fine Coach, Car and Railway Varnishes, Carmines, Lakes, Vermilions, White Lead, Zinc, etc.

Fine Brushes for Artists, Decorators, Coach Car, House and Sign Painters,

Artists' Materials, Decorative Tube Colors.

AGENTS FOR

Crockett's Preservative and Genuine Spar Composition.

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Manufacturers of Fine

RAILWAY VARNISHES,

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Fine Brushes adapted for railroad use. All kinds of Artists' Materials. Colors for ready use, and all specialties for Railroad and Carriage purposes.

Railroad companies will save themselves great trouble in painting by allowing F. W. DEVOE & Co. to prepare their Passenger and Freight Car Colors. This will insure Durability, Uniformity and Economy. F. W DEVOE & Co. manufacture from the crude materials which are the component parts of any shade, and they understand better their chemical relationship when in combination, than can be possible to those who simply buy their dry materials and then grind them.

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For cost of advertising in any paper or list of papers published in the United States or Canada, send to the ADVERTISING AGENCY of *EDWIN ALDEN & BRO.*,

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DAVIS' SAFETY CAR-TRUCK.

This device, which has been subjected to Two Severe Experimental Tests upon the Canadian Pacific Railway, has proved itself to Possess

ALL THE REQUIREMENTS OF A PERFECT SAFETY TRUCK-APPLIANCE.

In the event of Derailment, the Truck remains in its proper position with respect to the Car; and in the event of Broken Axles, the Truck-Frames are kept Parallel to the Car.

It can be applied to Freight-Cars of all kinds, to Passenger and Sleeping-Cars, and to Locomotives and Tenders.

The following extract appeared as an Editorial in the Montreal Daily Herald, of February 24th, 1886:

RAILWAY NEGLECT.

Now that railways have become a necessity to Canada, and that the traveling public are compelled to use them and to entrust their lives and property, nothing should be left undone to ensure to passengers absolute safety and unquestioned security. The railways should be as safe to travelers as money and inventive talent can by any possibility make them. But we all know they are not. We cannot take up a newspaper without reading of an accident of some kind, and many of these are due to defective rails, to cars jumping the track from one cause or another, upsetting, rolling down embankments, etc. The derailing of trains is heard of more frequently of late than formerly; but whether this is due to an increase in the number of such accidents, or to the more complete reporting of accidents in the newspapers of the present day, we are unable to say. It is sufficient to know that *preventable* accidents are happening, and this is just what the traveling public are not disposed to tolerate. There is a complaint, too—it proceeds, of course, from inventors and their friends—that railway managements are indisposed to adopt new devices for increasing the security extended to the public, even when they are not expensive. But railway men say, and very truly, that they are pestered almost to the verge of insanity by "inventors," with all sorts of whimsical contrivances, and that life would not be worth living if they were to seriously consider all the notions which inventors thrust upon their notice. There is of course much in what they say, and perhaps they ought to be sympathized with rather than criticized for neglecting so-called opportunities for enhancing the security to life on their railway properties. There was one invention, however, which, it was hoped, would have been taken advantage of by the Canadian railway authorities and utilized without unnecessary delay, as its practical working had been demonstrated to the satisfaction of the principal heads of the mechanical department in our leading railways. We refer to Mr. S. Davis' patent for preventing the derailment of cars, with consequent overturns and "smash-ups." A practical experiment demonstrating the utility and exceeding great value of this invention was made in the yard of the Canadian Pacific Railway, at Hochelaga, on the 27th July last, when cars traveling at the rate of fifteen to eighteen miles an hour passed safely over the track from which the irons had been removed, coming to a halt in about a car's length, with the trucks perfectly in line with the car-body; and in the case where one rail was removed, the wheels of one side of the car adhered to the remaining rail while the wheels on the opposite side passed over the earth and sleepers, mounted the rail at the end of the gap and proceeded on as if nothing had happened. The editor of the *Railway Age* came all the way from Chicago to witness the experiments, which were so successful as to leave nothing to be desired. The details of the invention need not be stated here; the invention itself is simple and comparatively inexpensive. What we wish to call attention to more particularly is the singular fact that although these experiments took place in July last, and the value of the invention in the interest of human life is unquestionable, nothing has been done to bring it into practical use on our Canadian railways. This is scarcely fair to the traveling public. If it were a doubtful experiment we could appreciate its delay; if it were a costly affair perhaps some excuse might reasonably be urged by poor corporations; but since neither of these is the fact it is hard to understand why so valuable an aid to the security of travel is not being utilized. Perhaps when some dreaful accident from the derailing of a train comes again to shock the Canadian public, and a railway company has been made to pay a heavy bill of damages for deaths and maimings, and suffered much loss of property, it will dawn upon our railway managers that they have achieved considerable loss of reputation and incurred heavy expenditures through their failure to avail themselves of a simple invention which is within the reach of the most impecunious railway corporation.

FURTHER ENDORSEMENT.

In dwelling upon a recent accident on the Northern Railway, at Thornhill, Ont., the Montreal Star, of March 3d, speaks as follows:

It occurred to Mr. S. Davis, of Montreal, that the tendency of railway-cars to run off the line might be stopped by limiting the turning capacity of the trucks to the extent of the greatest curvature of the railways. The maximum curvature is very slight and actual experiment has shown that cars constructed on this principle will not leave the rails under any circumstances. Mr. Davis has patented his invention. If the cars at Thornhill had been made on this principle they would not have left the track and consequently they would not have rolled down the embankment. If there is any good reason why this simple and cheap appliance should not come into general use for the prevention of such frequent and disastrous accidents it would be as well to make it known. Many lives and much money are lost every year by trains running off the track; if the accidents are, as they seem to be, preventable, somebody ought to be held to strict account for every such occurence.

A Full Illustrated Description of the Car-Truck appeared in the AMERICAN RAILROAD JOURNAL *for October, 1885.*

Full particulars will be furnished by addressing,

S. DAVIS,

P. O. Box, 447.

MONTREAL, CANADA.

VOL. 58 No. 4

THE AMERICAN RAILROAD JOURNAL

APRIL, 1885.

American Railroad Journal,
A MONTHLY MAGAZINE AND REVIEW.
No. 233 PEARL STREET,
NEW YORK.

Woodman's Non-Clogable Ticket Punch,

(Patented October 2, 1883.)

Adapted to every style of Ticket in use. Also B. C. ½, L. G., S. C. and 3. C. Punches.

THIS PUNCH is an improvement over the Holden, Pond & Hudson Patent Ticket Punches, so well known throughout the North, South and Canada—being very extensively used on the leading railroads in both countries. These goods are made strictly of CAST STEEL, hardened and tempered. I use no iron in their construction. All Punches nickel-plated and warranted.

R. WOODMAN,

Sole Manufacturer and Proprietor of Holden, Pond & Hudson's Ticket Punch Patents.

Before purchasing elsewhere please send for Price List and Circular of 400 different designs.

169 High Street, Boston, Mass., U. S. A.

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PROTECTED BY PATENTS.

An Indestructible and Imperishable Material for Decorative Purposes.

ITS APPLICATIONS:

Decoration for walls and ceilings. Takes the place of carved wood for moldings, stop blocks, wainscoting, panels, either for indoor or outdoor purposes, being equally durable and beautiful, but more economical.

WATER-PROOF. **DESIGNS IN HIGH RELIEF.**

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Indispensable for decoration of cars

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Passenger Cars

of the finest finish, as well as every description of CAR WORK, furnished at short notice and at reasonable prices, by the

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Incorporated under the laws of the State of New York

INTERNATIONAL BANK NOTE CO.

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ALL WORK GUARANTEED.

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FIRE AND BURGLAR

SAFES

Have many Patented Improvements not found in other makes, that will well repay an investigation by those who desire to secure

THE BEST SAFE.

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623 Chestnut Street, Phila.

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The John Stephenson Company,

LIMITED.

TRAM-CAR BUILDERS,

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Superior Elegance, Lightness and Durability. The result of 30 years experience.

Adapted to all countries and climates. Combining all valuable improvements. Shipped to foreign parts with greatest care, and at most favorable rates.

GET THE BEST.

CHAS. D. THUM,

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PHILADELPHIA,

Manufacturer of every description of

Coach, Carriage and Railway

Brushes;

Paint and Sash Tools,

Fitch, Badger & Camel-Hair Varnish (extra thick and strong).

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The celebrated THUM HALF-ELASTIC VARNISH BRUSH is warranted to stand until it is worn out. It can be used for painting without being previously worn down; will last longer and carry more varnish than any other brush. Ask your dealer for them, or send for a circular.

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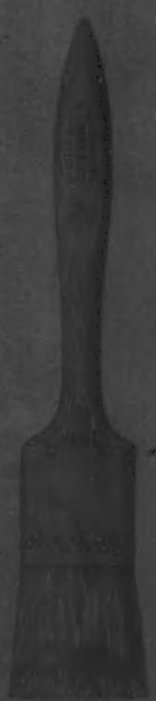

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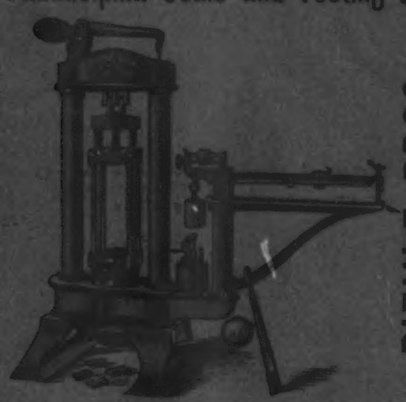
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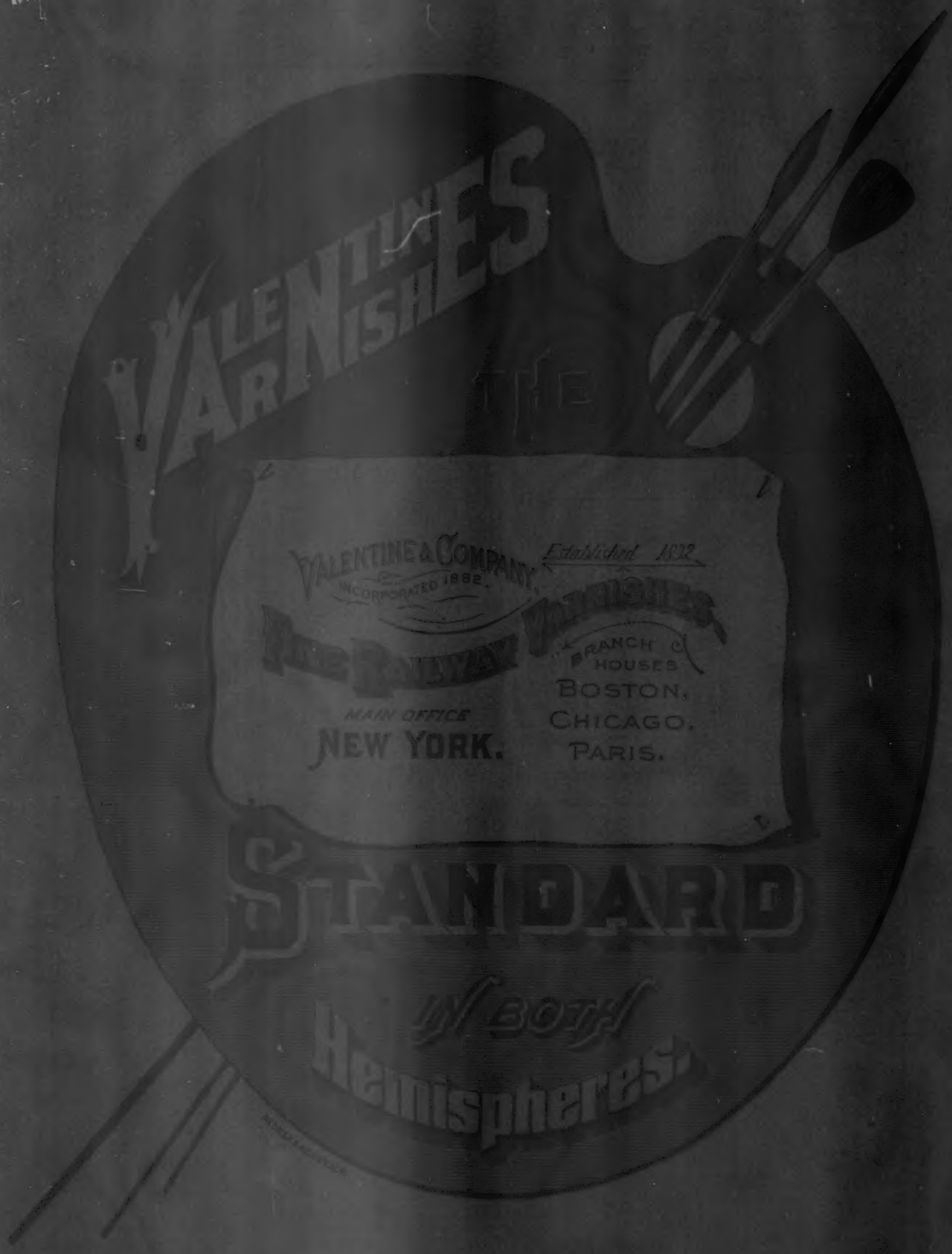
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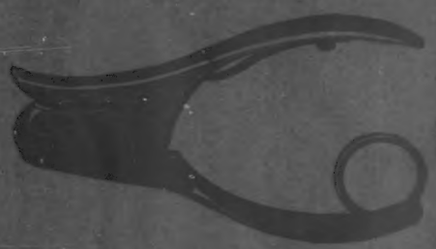

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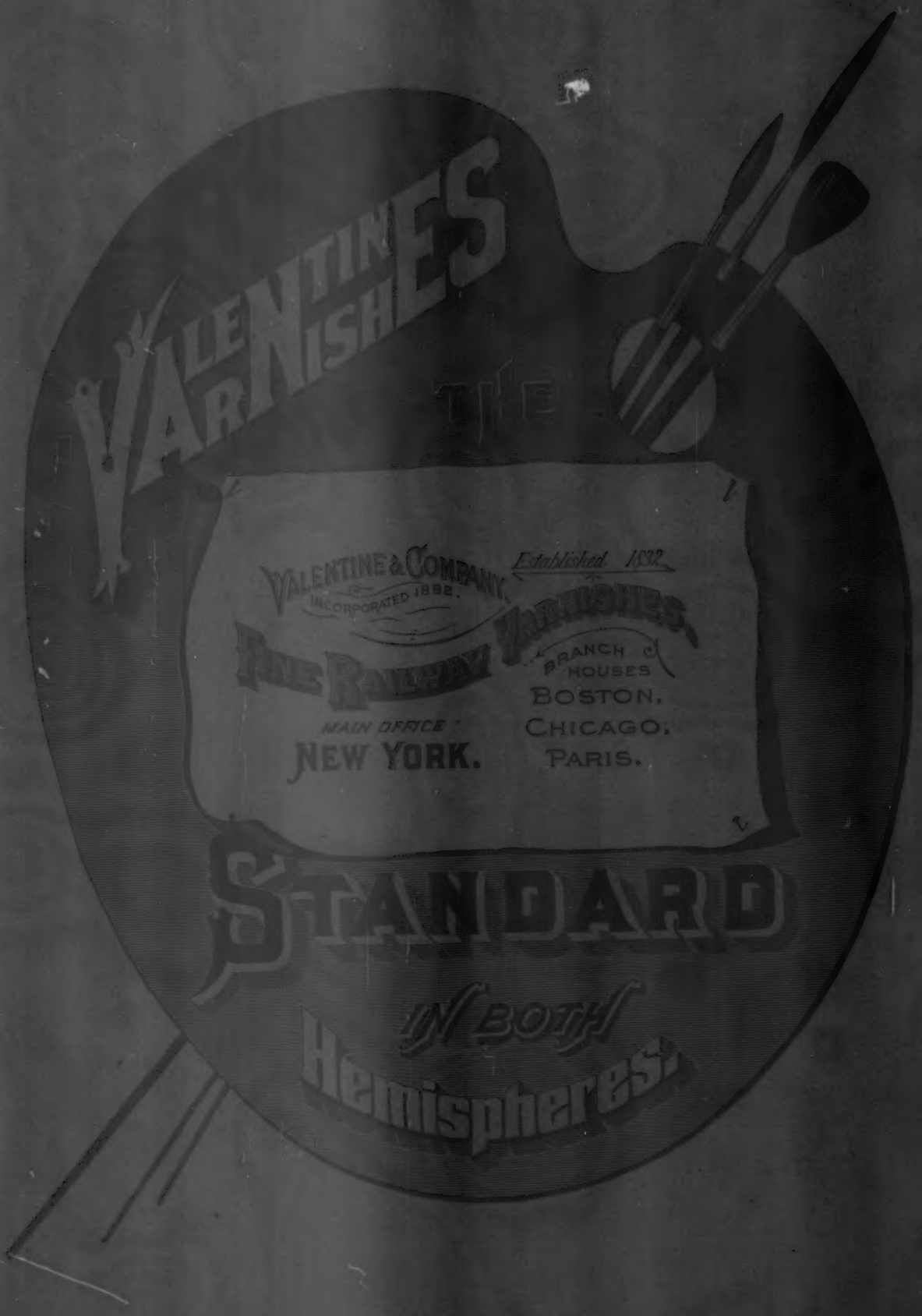
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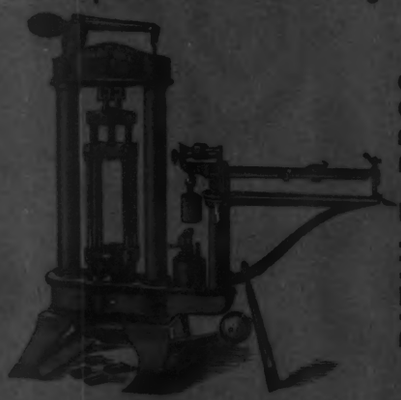

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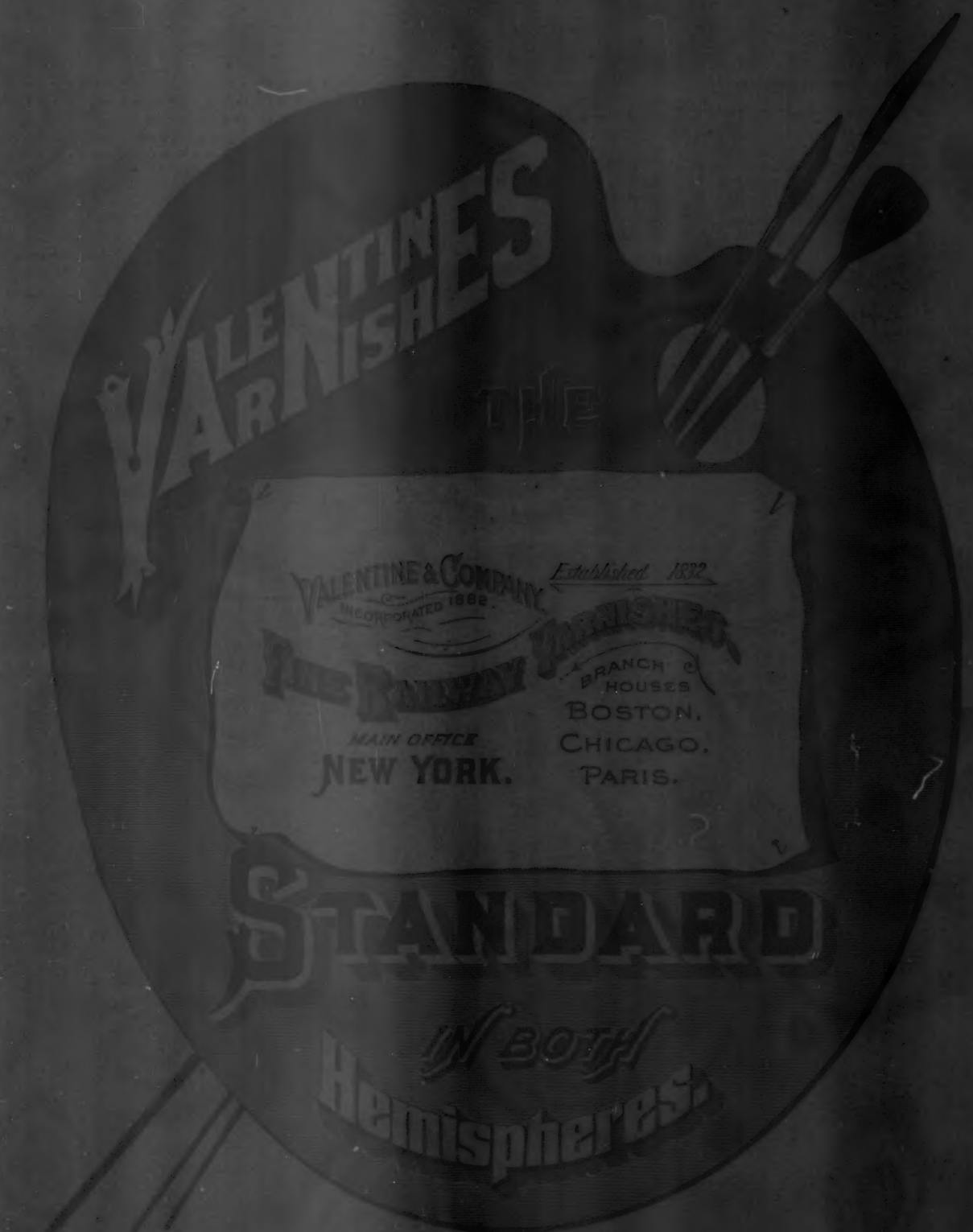
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